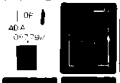
AD-A087 792 GAI CONSULTANTS INC MONROEVILLE PA F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. ROSE VALLEY LAKE DAM (NDI I.D.=-ETC(U)
JUL 80 B M MIHALCIN DACW31-80-C-0016
UNCLASSIFIED NL



END
DATE FILMED
9-80
DTIC

LEVEL II

B.S.

ADA087792

SUSQUEHANNA RIVER BASIN
MILL CREEK, LYCOMING COUNTY

PENNSYLVANIA

ROSE VALLEY LAKE DAM

NDI I.D. No. PA-01127
PENNDER I.D. No. 41-97

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PREPARED FOR

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

Ber

PREPARED BY

GAI CONSULTANTS, INC.
570 BEATTY ROAD
MONROEVILLE, PENNSYLVANIA 15146

JULY 1980

GAI CONSULTANTS, INC.
DACW31-80-C-0016

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topograhic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

National Dam Inspection Program.
Rose Valley Lake Dam (NDI I.D. Number PA-Ø1127, PennDER I.D. Number 41-97), Susquehanna River Basin, Mill Creek, Lycoming County, Pennsylvania.

PHASE I INSPECTION REPORT,
NATIONAL DAM INSPECTION PROGRAM.

ABSTRACT

Rose Valley Lake Dam: NDI I.D. No. PA-01127

Owner:	Pennsylvania Fish Commission
State Located:	Pennsylvania (PennDER I.D. No. 41-97)
County Located:	Lycoming
Stream:	Mill Creek
Inspection Date:	23 April 1980
Inspection Team:	GAI Consultants, Inc. 570 Beatty Road Monroeville, Pennsylvania 15146

The visual inspection, operational history, and hydrologic/hydraulic analysis indicate that the facility is in excellent condition.

The size classification of the facility is intermediate and its hazard classification is considered to be high. In accordance with the recommended guidelines, the Spillway Design Flood (SDF) for the facility is the PMF (Probable Maximum Flood). Results of the hydrologic and hydraulic analysis indicate the facility is capable of passing and/or storing the PMF. Consequently, its spillway is considered adequate.

It is recommended that the owner immediately:

(a.) Provide positive drainage for the area between the left spillway wingwall and left abutment hillside; and

b.) Repair and seal all concrete cracks observed along the left spillway wingwall.

GAI Consultants, Inc.

Bernard M. Mihalcin

Bernard M. Mihalcin, P.E.

Approved by:

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
BERNARD M. MIHALCIN
ENGINEER
20371-E

Date 11 July 1980

Date 21 July 1980

OVERVIEW PHOTOGRAPH

TABLE OF CONTENTS

TABLE OF CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
ROSE VALLEY LAKE DAM
NDI# PA-01127, PENNDER# 41-97

SECTION 1
GENERAL INFORMATION

1.0 Authority.

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers to initiate a program of inspection of dams throughout the United States.

1.1 Purpose.

The purpose is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Rose Valley Lake Dam is a zoned earth embankment approximately 26 feet high and 516 feet long, including spillway. The facility is provided with an uncontrolled, rectangular, concrete chute channel spillway and stilling basin located at the left abutment. The spillway crest consists of a trapezoidal shaped weir structure 80 feet in length. The outlet works consists of a 4-foot square reinforced concrete culvert that discharges at the downstream embankment toe. Flow through the culvert is regulated by both a 36-inch diameter slide gate and removable stop logs set within a concrete vertical riser positioned along the upstream embankment face.

b. Location. Rose Valley Lake Dam is located on Mill Creek in Gamble Township, Lycoming County, Pennsylvania. The community of Trout Run, Pennsylvania is situated about three miles southwest of the dam at the intersection of U. S. Route 15 and Pennsylvania Route 14. The dam and reservoir are contained within the Bodines, Pennsylvania 7.5 minute U.S.G.S. topographic quadrangle (see Figure 1, Appendix E). The coordinates of the dam are N41°23.1' and W76°59.9.

c. Size Classification. Intermediate (26 feet high, 6500 acre-feet storage capacity at top of dam).

d. Hazard Classification. High (see Section 3.1.e).

e. Ownership. Pennsylvania Fish Commission
P. O. Box 1673
Harrisburg, Pennsylvania 17120

f. Purpose. Recreation.

g. Historical Data. Rose Valley Lake Dam was designed by the Pennsylvania Fish Commission as a public fishing and recreational facility. The project was completed in 1972. The general contractor responsible for construction was the Giffin Construction Company of LeRaysville, Pennsylvania. No major modifications have been made to the facility since its completion.

1.3 Pertinent Data.

a. Drainage Area (square miles). 3.4

b. Discharge at Dam Site.

Discharge Capacity of Outlet Conduit - Discharge curves are not available.

Discharge Capacity of Spillway at Maximum Pool ≈ 4620 cfs (see Appendix D, Sheet 10).

c. Elevation (feet above mean sea level). The following elevations were obtained from available drawings and through field measurements based on the elevation of the spillway crest at 1235.0 feet (see Appendix D, Sheet 1).

Top of Dam	1241.0
Maximum Design Pool	1240.5
Maximum Pool of Record	Not known.
Normal Pool	1235.0
Spillway Crest	1235.0
Upstream Inlet Invert	1215.5
Downstream Outlet Invert	1215.0
Streambed at Dam Centerline	1215.0
Maximum Tailwater	Not known.

d. Reservoir Length (feet).

Top of Dam	6400
Normal Pool	6200

e. Storage (acre-feet).

Top of Dam	6500
Maximum Design Pool	6260
Normal Pool	3940
Design Surcharge	240

f. Reservoir Surface (acres).

Top of Dam	447
Maximum Design Pool	441
Normal Pool	389

g. Dam.

Type	Zoned earth.
Length	436 feet (excluding spillway).
Height	26 feet (field measured; crest to downstream outlet invert).
Top Width	15 feet (field). 16 feet (design).
Upstream Slope	3H:1V
Downstream Slope	2.5H:1V
Zoning	Embankment constructed with four zones: selected impervious fill; class "A" fill; class "B" fill; selected pervious material. See notes on Figure 5 for description of zone materials.
Impervious Core	Central core comprised of selected impervious material. Carried full height of dam and has 1H:2V side slopes.

	Cutoff	12-foot wide trench excavated to rock and backfilled with selected impervious material.
	Grout Curtain	None indicated.
h.	Diversion Canal and Regulating Tunnels.	None.
i.	Spillway.	
	Type	Uncontrolled, rectangular, concrete chute channel constructed with a trapezoidal shaped concrete weir.
	Crest Elevation	1235.0
	Crest Length	80 feet.
j.	Outlet Conduit.	
	Type	4-foot square reinforced concrete culvert.
	Length	138 feet (inlet to outlet).
	Closure and Regulating Facilities	Flows through outlet are controlled by both a 36-inch diameter slide gate and removable stop logs set in grooves within a reinforced concrete control tower riser.
	Access	Control tower accessible from embankment crest.

SECTION 2
ENGINEERING DATA

2.1 Design.

a. Design Data Availability and Sources. No formal design reports are available. The Pennsylvania Fish Commission maintains an extensive file on this facility that includes design calculations and drawings, boring logs, laboratory and field test results, and contract specifications. In addition, a report entitled, "Geology of the Proposed Mill Creek Dam Site" by William D. Sevon of the Pennsylvania Geological Survey is also available. PennDER files contain miscellaneous correspondence, construction progress reports and photographs.

b. Design Features.

1. Embankment. The embankment is designed as a zoned earth structure consisting of four distinct zones as detailed and defined in Figure 5. Selected impervious fill comprises the core and cutoff trench. The core is apparently carried the full height of the dam and has 1H:2V side slopes. The upstream zone consists of selected semi-impervious material (class "A" fill). Riprap is provided on the 3H:1V upstream slope between the top of dam and elevation 1231.0. The downstream zone consists of selected semi-impervious material (class "B" fill) distinct from the material used in the upstream zone. The embankment outer shell is composed of selected pervious material. The downstream embankment face is sloped at 2.5H:1V. A 2-foot thick filter is shown to have been placed beneath the downstream zone with a toe drain at the downstream toe of the fill.

2. Appurtenant Structures.

a) Spillway. The spillway at Rose Valley Lake Dam is a reinforced concrete chute channel with a trapezoidal shaped overflow weir located at the left abutment. The crest length of the weir measures 80 feet and is flanked by vertical concrete wingwalls that provide 6 feet of freeboard (see Figures 3 and 6).

b) Outlet Works. The outlet works consists of a reinforced concrete riser and 4-foot square horizontal culvert which discharges at the downstream embankment toe. Flows through the conduit are controlled by both a 36-inch diameter slide gate and removable stop logs set in grooves within the control tower riser (see Figures 3 and 10).

c. Specific Design Data and Criteria. The dam and its appurtenances are, for the most part, proven standard Pennsylvania Fish Commission designs. Calculations contained in PFC files indicate that the embankment and spillway design were based on procedures and guidelines contained in the texts "Design of Small Dams" by the U. S. Bureau of Reclamation and "Handbook of Applied Hydraulics" by Davis and Sorensen. The spillway was sized to meet the requirements of the Pennsylvania "C" Curve.

2.2 Constructions Records.

Design drawings, contract specifications, construction progress reports and photographs are available from PennDER and Pennsylvania Fish Commission files. Some soils and concrete field test data are also available.

2.3 Operational Records.

No records of the day-to-day operation of this facility are maintained.

2.4 Other Investigations.

No formal investigations have been performed on this facility subsequent to its construction.

2.5 Evaluation.

The available data indicate the facility was designed and constructed in accordance with modern accepted criteria and techniques. The information available is considered adequate to make a reasonable Phase I assessment of the facility.

SECTION 3
VISUAL INSPECTION

3.1 Observations.

a. General. The general appearance of this project indicates the dam and its appurtenances are currently in excellent condition.

b. Embankment. Observations made during the visual inspection indicate the embankment is in excellent condition. No evidence of sloughing, erosion, seepage through the embankment face, excessive settlement, animal burrows, or signs of maintenance neglect were observed (see Photograph 1). A poor drainage condition was observed between the spillway wingwall and left abutment hillside. Figure 3 indicates that a rock gutter was to have been provided at the base of the abutment cut; however, it was apparently never constructed.

c. Appurtenant Structures.

1. Spillway. The visual inspection revealed the spillway is in good condition. Some minor cracking was observed along the left spillway wingwall (see Photograph 3). No other deficiencies were noted (see Photographs 1 and 2).

2. Outlet Works. The outlet works are in excellent condition. The interior of the 4-foot square box culvert was inspected. It was noted that all joints were sealed and no cracking or leakage was in evidence. No signs of concrete deterioration were observed on the interior or exterior surfaces of the control tower. The 36-inch diameter slide gate was operated in the presence of the inspection team and is considered to be in excellent condition (see Photographs 4, 5, 6, and 7).

d. Reservoir Area. The general area surrounding Rose Valley Lake is comprised of gentle to moderate slopes immediately around the lake and steep slopes in the more distant reaches of the watershed. The immediate slopes are primarily cultivated while the distant slopes are heavily forested.

e. Downstream Channel. The channel downstream of Rose Valley Lake Dam is characterized as a narrow, primarily wooded valley with steep confining slopes. The first permanent structure situated near the streambed is a private residence located approximately one mile downstream of the embankment (see Photograph 8). Four more dwellings are

located along the stream within the next six miles prior to Mill Creek passing through the community of Warrensville, Pennsylvania. The floodplain widens significantly near Warrensville and remains fairly broad until it merges with Loyalsock Creek, near Williamsport, Pennsylvania about 12 miles downstream of the dam. It is estimated that many lives could be lost and significant damage could be incurred as the result of an embankment breach. Consequently, the hazard classification for this facility is considered to be high.

3.2 Evaluation.

The overall condition of the facility is considered excellent. The only deficiencies noted were minor cracking of the left spillway wingwall and poor drainage between the wingwall and left abutment. Both conditions require remedial attention.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Normal Operating Procedure.

Rose Valley Lake Dam is essentially a self-regulating facility. Excess inflows are automatically discharged through the emergency spillway. Under normal operating conditions the outlet conduit is closed; however, the gate is opened two or three times a year to insure its operability.

The Pennsylvania Fish Commission has developed a formal Operation and Maintenance Manual for this facility that establishes both routine and emergency operating procedures.

4.2 Maintenance of Dam.

Formal procedures and guidelines for the complete maintenance of this facility are contained in the Operation and Maintenance Manual. The manual includes a formal maintenance checklist covering the entire facility.

4.3 Maintenance of Operating Facilities.

See Section 4.2 above.

4.4 Warning System.

A "Flood Emergency Operation Procedure" has been incorporated into the Operation and Maintenance Manual. The plan is a coordinated effort involving the Pennsylvania Fish Commission, PennDER, and the Lycoming County Emergency Management Agency (EMA, civil defense). A detailed evacuation plan is currently being developed by the EMA which, when complete, will become part of this plan.

4.5 Evaluation.

The operation and maintenance of Rose Valley Lake Dam has been formally established through the Operation and Maintenance Manual developed by the Pennsylvania Fish Commission. A formal warning system for the protection of downstream residents is available and has been incorporated into this manual although a detailed evacuation plan has not yet been prepared.

SECTION 5
HYDROLOGIC/HYDRAULIC EVALUATION

5.1 Design Data.

Calculations contained in Pennsylvania Fish Commission files indicate that the hydrologic and hydraulic design of Rose Valley Lake Dam was based on the Pennsylvania "C" Curve along with procedures and guidelines contained in the texts, "Design of Small Dams" by the U. S. Bureau of Reclamation, and "Handbook of Applied Hydraulics" by Davis and Sorensen.

The data indicate that the spillway design flow from the "C" Curve is 3970 cfs. The maximum spillway discharge capacity as computed by our analysis is 4620 cfs (see Appendix D, Sheet 10).

5.2 Experience Data.

Daily records of reservoir levels and/or spillway discharges are not available. The general appearance of the facility suggests adequate past performance.

5.3 Visual Observations.

On the date of inspection, no conditions were observed that would indicate the spillway could not perform satisfactorily during a flood event within the limits of its design capacity.

5.4 Method of Analysis.

The facility has been analyzed in accordance with the procedures and guidelines established by the U. S. Army, Corps of Engineers, Baltimore District, for Phase I hydrologic and hydraulic evaluations. The analysis has been performed utilizing a modified version of the HEC-1 program developed by the U. S. Army, Corps of Engineers, Hydrologic Engineering Center, Davis, California. Analytical capabilities of the program are briefly outlined in the preface contained in Appendix D.

5.5 Summary of Analysis

a. Spillway Design Flood (SDF). In accordance with

procedures and guidelines contained in the National Guidelines for Safety Inspection of Dams for Phase I Investigations, the Spillway Design Flood (SDF) for Rose Valley Lake Dam is the PMF (Probable Maximum Flood). This classification is based on the relative size of the dam (intermediate), and the potential hazard of dam failure to downstream developments (high).

b. Results of Analysis. Rose Valley Lake Dam was evaluated under near normal operating conditions. That is, the reservoir was initially at its normal pool or spillway elevation of approximately 1235.0, with the spillway weir discharging freely. The outlet conduit was considered to be non-functional for the purpose of analysis, since the flow capacity of the conduit is not such that it would significantly increase the total discharge capabilities of the facility. The spillway consists of a rectangular, concrete chute channel with discharges controlled by a flat crested trapezoidal shaped weir. All pertinent engineering calculations relative to the evaluation of this facility are provided in Appendix D.

Overtopping analysis (using the Modified HEC-1 Computer Program) indicated that the discharge/storage capacity of Rose Valley Lake Dam can accommodate storms in excess of the PMF (SDF) without embankment overtopping. The peak PMF inflow of approximately 9340 cfs was greatly attenuated by the discharge/storage capabilities of the dam and reservoir, such that the resulting peak outflow was about 4060 cfs. The peak outflow is, thus, less than the spillway capacity calculated to be 4620 cfs. Under the PMF event, the reservoir level rose to elevation 1240.5, or about 0.5 feet below the low top of dam elevation of 1241.0 (Appendix D, Summary Input/Output Sheets, Sheet C).

5.6 Spillway Adequacy.

Rose Valley Lake Dam was found to be capable of passing and/or storing the inflow from its SDF (the PMF), and therefore its spillway is considered to be adequate.

SECTION 6
EVALUATION OF STRUCTURAL INTEGRITY

6.1 Visual Observations.

a. Embankment. Based on visual observations, the embankment appears to be in excellent structural condition. No deficiencies were noted with regards to the main structure. The poor drainage condition observed at the left abutment, adjacent the left spillway wingwall, is an apparent construction oversight. Design drawings indicate a trench drain was to be installed along the left embankment-abutment contact, but, was apparently overlooked. Excessive hydrostatic and/or ice pressures behind the left spillway wingwall could develop because of this poorly drained condition and could result in damage to the spillway structure if left uncorrected.

b. Appurtenant Structures.

1. Spillway. The spillway appears to be structurally well designed and currently in good condition. Cracking observed in the left spillway wingwall is considered minor at this time. Nevertheless, concrete cracks should be regularly filled and/or sealed with epoxy to forestall continuing deterioration.

2. Outlet Works. The outlet works, which include both the control tower riser and 4-foot square discharge culvert, are considered to be in excellent condition. No deficiencies were noted.

6.2 Design and Construstion Techniques.

Available design data indicates that the facility has been adequately designed in conformance with modern accepted engineering practice. Many of its features have been repeatedly incorporated into similar Pennsylvania Fish Commission designs and have proven their reliability.

Discussions with Fish Commission representatives revealed the project was finished in a timely manner and that no significant problems were incurred during construction.

6.3 Past Performance.

According to Pennsylvania Fish Commission personnel, the facility has operated virtually problem-free throughout its eight year history.

6.4 Seismic Stability.

The dam is located in Seismic Zone No. 1 and may be subject to minor earthquake induced dynamic forces. As the facility appears well constructed and sufficiently stable, it is believed that it can withstand the expected dynamic forces; however, no calculations and/or investigations were performed to confirm this belief.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS FOR REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. The visual inspection, operational history, and available engineering data indicate the facility is in excellent condition.

The size classification of the facility is intermediate and its hazard classification is considered to be high. In accordance with the recommended guidelines, the Spillway Design Flood (SDF) for the facility is the PMF (Probable Maximum Flood). Results of the hydrologic and hydraulic analysis indicate the facility is capable of passing and/or storing the PMF. Consequently, its spillway is considered adequate.

b. Adequacy of Information. The available data are considered sufficient to make a reasonable Phase I assessment of the facility.

c. Urgency. The recommendations listed below should be implemented immediately.

d. Necessity for Additional Investigations. No additional investigations are currently deemed necessary.

7.2 Recommendations/Remedial Measures.

It is recommended that the owner immediately:

a. Provide positive drainage for the area between the spillway wingwall and left abutment hillside.

b. Repair and seal all concrete cracks observed along the left spillway wingwall.

APPENDIX A

VISUAL INSPECTION CHECKLIST AND FIELD SKETCHES

CHECK LIST
VISUAL INSPECTION
PHASE 1

NAME OF DAM Rose Valley Lake Dam STATE Pennsylvania COUNTY Lycoming

NDI # PA — 01127 PENNDER # 41-97

TYPE OF DAM Earth SIZE Intermediate HAZARD CATEGORY High

DATE(S) INSPECTION 23 April 1980 WEATHER Sunny TEMPERATURE 70° @ 1:30 p.m.

POOL ELEVATION AT TIME OF INSPECTION 1235.1 Feet M.S.L.

TAILWATER AT TIME OF INSPECTION N/A M.S.L.

INSPECTION PERSONNEL	OWNER REPRESENTATIVES	*OTHERS*
B. M. Mihalcin	Pennsylvania Fish Commission	
D. J. Spaeder	E. Jon Grindall	
D. L. Bonk	D. O'Neill	
W. J. Veon	E. Smith	
	C. Hess	

RECORDED BY D. L. Bonk

EMBANKMENT

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 01127
SURFACE CRACKS	None observed.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Horizontal - good. Vertical - good.
RIPRAP FAILURES	Limestone and sandstone riprap protects the entire upstream embankment face. Good condition.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Good condition. Seepage observed through left abutment rock (estimated ≈ 2-3 gpm). Water collects between left spillway wingwall and abutment due to poor drainage.

EMBANKMENT

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 01127
DAMP AREAS IRREGULAR VEGETATION (LUSH OR DEAD PLANTS)	None observed along downstream embankment face to toe.
ANY NOTICEABLE SEEPAGE	Seepage observed through left abutment rock (estimated ≃ 2-3 gpm). No seepage through embankment observed.
STAFF GAGE AND RECORDER	None.
DRAINS	Two drains observed through outlet channel wingwalls at downstream toe. Right drain is wet with no discernable flow. Left drain discharging at less than 1/2 gpm.
ROCK OUTCROPS	Left abutment - Horizontally bedded red and blue-gray sandstones and siltstones.

OUTLET WORKS

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 01127
INTAKE STRUCTURE	Intake submerged. Control tower in excellent condition. No evidence of concrete deterioration.
OUTLET CONDUIT (CRACKING AND SPALLING OF CONCRETE SURFACES)	Good condition. Interior joints have been sealed. No cracks or leakage observed.
OUTLET STRUCTURE	Excellent condition.
OUTLET CHANNEL	Rock lined trapezoidal shaped channel. Good condition.
GATE(S) AND OPERATIONAL EQUIPMENT	Gate operated in the presence of the inspection team. Good condition.

EMERGENCY SPILLWAY

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 01127
TYPE AND CONDITION	Uncontrolled, rectangular, concrete chute channel located at left abutment. Good condition. Flows are controlled by a trapezoidal shaped, flat crested weir.
APPROACH CHANNEL	Rock lined.
SPILLWAY CHANNEL AND SIDEWALLS	Right wingwall and channel floor are in excellent condition. Minor cracking observed in left wingwall. Evidence of some leakage through the cracks observed.
STILLING BASIN PLUNGE POOL	60-foot by 60-foot concrete stilling basin with vertical wingwalls.
DISCHARGE CHANNEL	Rock lined, trapezoidal shaped channel.
BRIDGE AND PIERS EMERGENCY GATES	Small concrete roadway bridge across channel immediately downstream of embankment.

SERVICE SPILLWAY

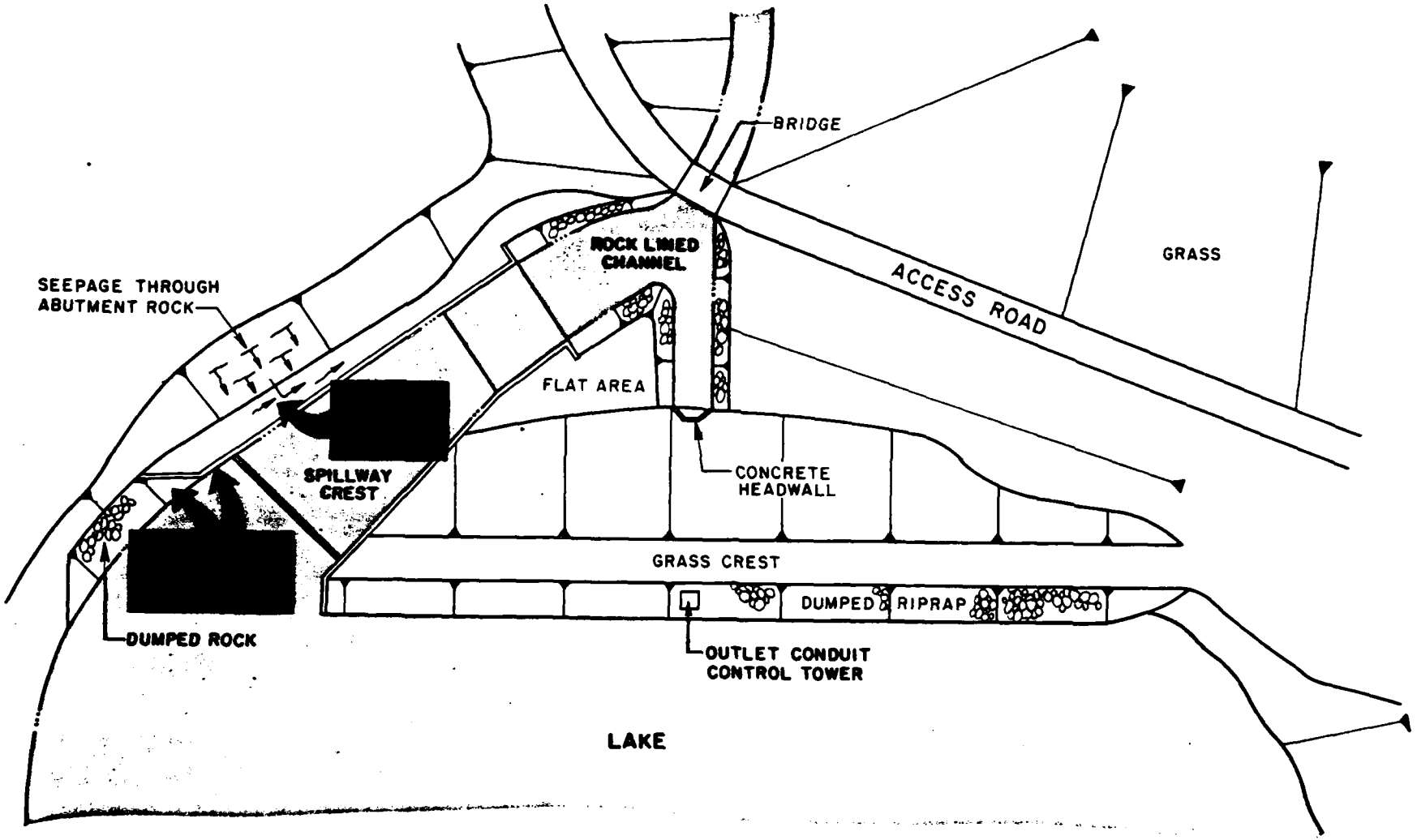
ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 01127
TYPE AND CONDITION	N/A.
APPROACH CHANNEL	N/A.
OUTLET STRUCTURE	N/A.
DISCHARGE CHANNEL	N/A.

INSTRUMENTATION

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 01127
MONUMENTATION SURVEYS	None observed.
OBSERVATION WELLS	None.
WEIRS	None.
PIEZOMETERS	None.
OTHERS	

RESERVOIR AREA AND DOWNSTREAM CHANNEL

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 01127
SLOPES: RESERVOIR	Immediate slopes are gentle to moderate and primarily cultivated. Distant slopes are steep and heavily forested.
SEDIMENTATION	None observed.
DOWNSTREAM CHANNEL (OBSTRUCTIONS, DEBRIS, ETC.)	Concrete and masonry roadbridge spans channel immediately downstream of the embankment.
SLOPES: CHANNEL VALLEY	The channel downstream is characterized as a narrow, primarily wooded valley with steep confining slopes. The floodplain widens about 6 miles downstream near the community of Warrensville, Pennsylvania and remains fairly broad until the stream merges with Loyalsock Creek about 12 miles downstream.
APPROXIMATE NUMBER OF HOMES AND POPULATION	Five dwellings are located near the streambed within 6 miles of the embankment prior to the stream passing through the community of Warrensville, Pennsylvania. It is estimated that many lives could be lost and significant damage incurred as the result of an embankment breach.

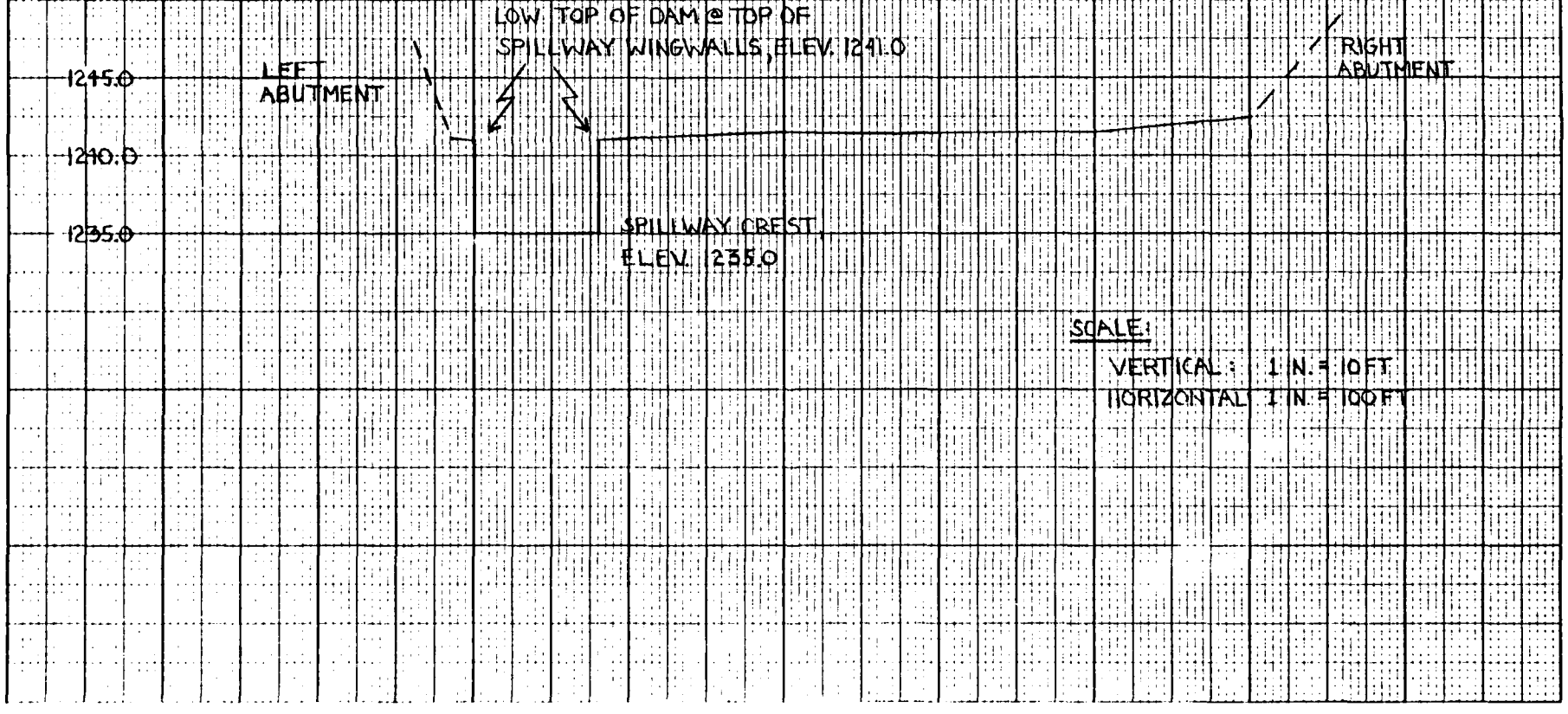


ROSE VALLEY LAKE DAM
GENERAL PLAN - FIELD INSPECTION NOTES

ROSE VALLEY LAKE DAM

PROFILE OF DAM CREST

FROM FIELD SURVEY



SCALE:

VERTICAL: 1 IN. = 10 FT.

HORIZONTAL: 1 IN. = 100 FT.

APPENDIX B

ENGINEERING DATA CHECKLIST

CHECK LIST
ENGINEERING DATA
PHASE I

NAME OF DAM Rose Valley Lake Dam

ITEM	REMARKS	NDI# PA - 01127
PERSONS INTERVIEWED AND TITLE	Pennsylvania Fish Commission (PFC) E. Jon Grindall - Senior Project Engineer D. O'Neill - Maintenance Supervisor E. Smith - Chief of Maintenance Construction C. Hess - Area Five Manager	
REGIONAL VICINITY MAP	See Appendix E, Figure 1.	
CONSTRUCTION HISTORY	Designed by Pennsylvania Fish Commission. Constructed in 1971-1972 by Giffin Construction Company of LeRaysville, Pennsylvania.	
AVAILABLE DRAWINGS	Complete set of 24 drawings available from both the PennDER and the Pennsylvania Fish Commission.	
TYPICAL DAM SECTIONS	See Appendix E, Figures 3 and 5.	
OUTLETS: PLAN DETAILS DISCHARGE RATINGS	See Appendix E, Figures 3 and 10. Discharge rating curves are not available.	

CHECK LIST
ENGINEERING DATA
PHASE I
(CONTINUED)

ITEM	REMARKS	NDI# PA -
SPILLWAY: PLAN SECTION DETAILS	See Appendix E, Figures 3, 6, 7 and 8.	
OPERATING EQUIP- MENT PLANS AND DETAILS	See Appendix E, Figure 9.	
DESIGN REPORTS	No formal design reports available. A preliminary engineering report by E. R. Miller, dated 1965, is contained in PFC files. Design calculations, specifications, daily construction reports and photographs are also available in PFC files.	
GEOLOGY REPORTS	"Geology of the Proposed Mill Creek Dam Site" by William D. Sevon of The Pennsylvania Geological Survey is contained in PFC files.	
DESIGN COMPUTATIONS: HYDROLOGY AND HYDRAULICS STABILITY ANALYSES SEEPAGE ANALYSES	Weir measurements, Stage/Storage Curves and Hydrological Study are contained in PFC files.	
MATERIAL INVESTIGATIONS: BORING RECORDS LABORATORY TESTING FIELD TESTING	Test Boring Report, Soils and Testing of Harrisburg, Pennsylvania, dated 1970, contained PFC and PennDER files. Soils and concrete field testing data are also available from the PFC.	

CHECK LIST
ENGINEERING DATA
PHASE I
(CONTINUED)

ITEM	REMARKS NDI# PA - 01127
BORROW SOURCES	Within reservoir. See Appendix E, Figure 2.
POST CONSTRUCTION DAM SURVEYS	None.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None.
HIGH POOL RECORDS	No formal records are available.
MONITORING SYSTEMS	None.
MODIFICATIONS	None.

CHECK LIST
ENGINEERING DATA
PHASE I
(CONTINUED)

ITEM	REMARKS	NDI# PA- 01127
PRIOR ACCIDENTS OR FAILURES	None.	
MAINTENANCE: RECORDS MANUAL	Regular maintenance guidelines are outlined in the Operation and Maintenance Manual available from PFC.	
OPERATION: RECORDS MANUAL	Outlet conduit open two or three times per year to insure its operability. Operation and Maintenance Manual available from PFC. No formal operating records are available.	
OPERATIONAL PROCEDURES	Self-regulating.	
WARNING SYSTEM AND/OR COMMUNICATION FACILITIES	Incomplete warning system contained in Operation and Maintenance Manual. PFC is currently working with local civil defense and other emergency action groups to refine and complete the system.	
MISCELLANEOUS		

GAI CONSULTANTS, INC.

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

NDI ID # 01127
PENNDER ID # 41-97

SIZE OF DRAINAGE AREA: 3.4 square miles.

ELEVATION TOP NORMAL POOL: 1235.0 STORAGE CAPACITY: 3940 acre-feet.

ELEVATION TOP FLOOD CONTROL POOL: - STORAGE CAPACITY: -

ELEVATION MAXIMUM DESIGN POOL: 1240.5 STORAGE CAPACITY: 6260 acre-feet.

ELEVATION TOP DAM: 1241.0 STORAGE CAPACITY: 6500 acre-feet.

SPILLWAY DATA

CREST ELEVATION: 1235.0 feet.

TYPE: Uncontrolled, rectangular, concrete chute channel.

CREST LENGTH: 80 feet.

CHANNEL LENGTH: 164.5 feet. (Does not include approach area).

SPILLOVER LOCATION: Left abutment.

NUMBER AND TYPE OF GATES: None.

OUTLET WORKS

TYPE: 4' by 4' reinforced concrete box culvert.

LOCATION: Near center of embankment.

ENTRANCE INVERTS: 1215.5 feet.

EXIT INVERTS: 1215.0 feet.

EMERGENCY DRAWDOWN FACILITIES: 36-inch diameter slide gate and removable stop logs.

HYDROMETEOROLOGICAL GAGES

TYPE: None.

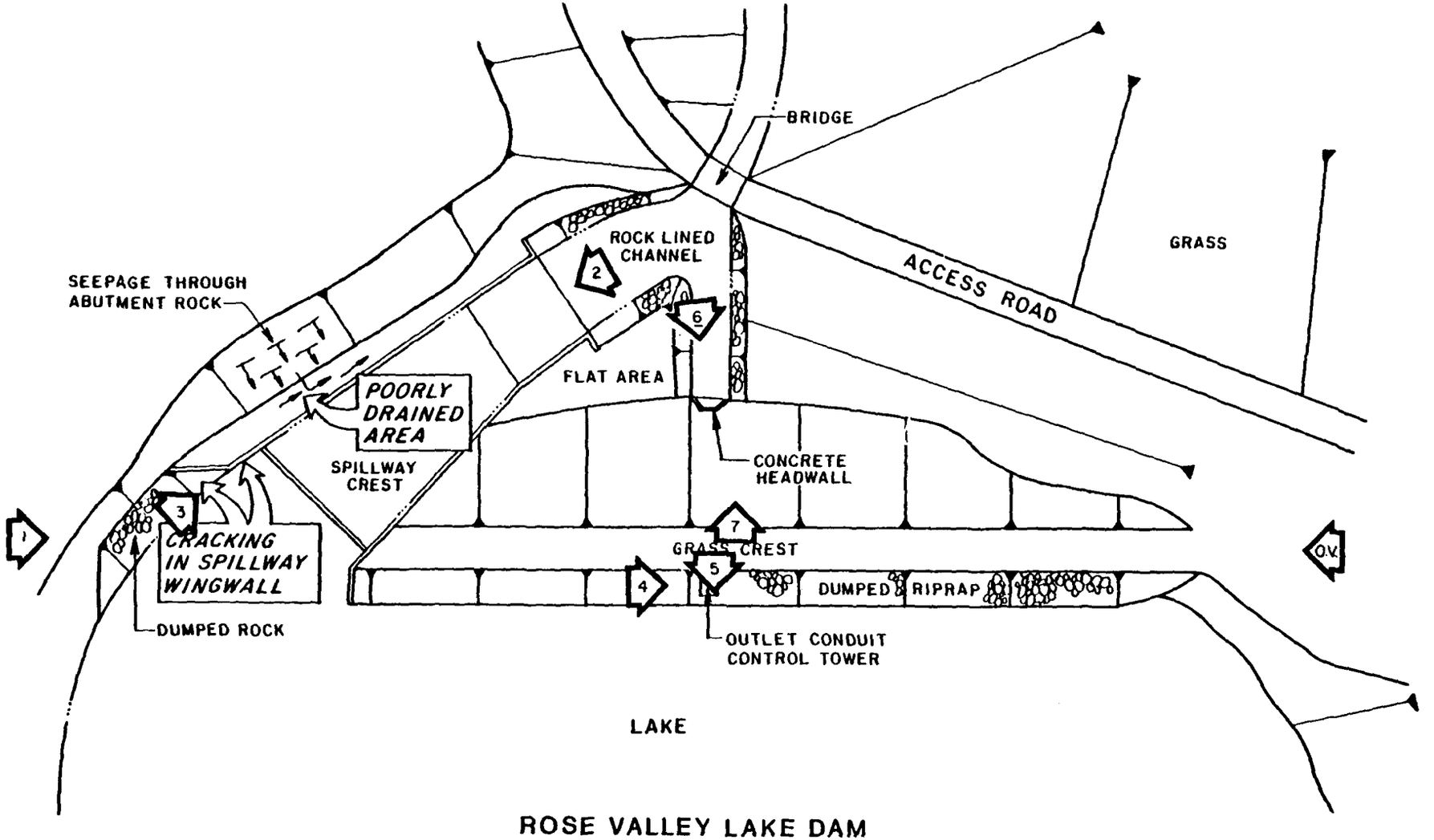
LOCATION: -

RECORDS: -

MAXIMUM NON-DAMAGING DISCHARGE: Not known.

APPENDIX C

PHOTOGRAPHS



ROSE VALLEY LAKE DAM
PHOTOGRAPH KEY MAP

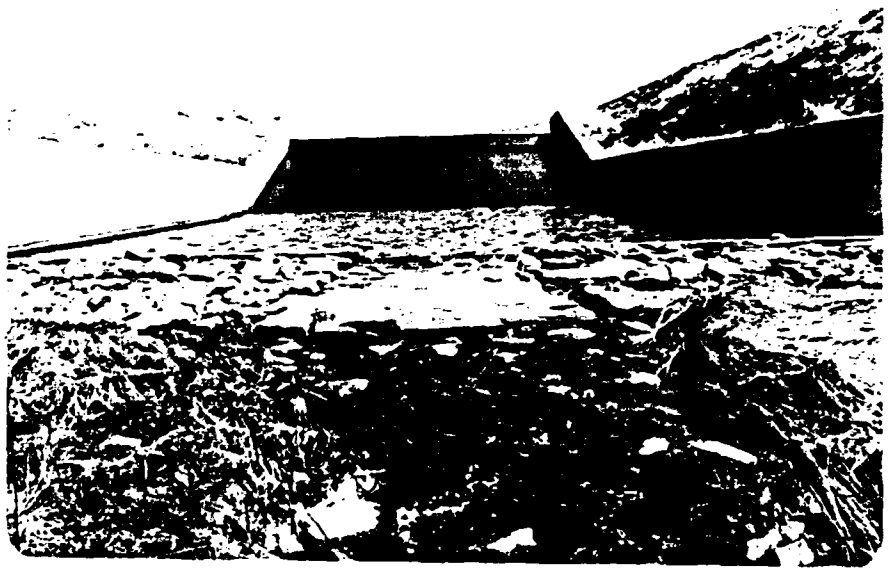
PHOTOGRAPH 1 View of the embankment as seen from the left abutment.

PHOTOGRAPH 2 View of the spillway looking upstream as seen from just beyond the stilling basin.

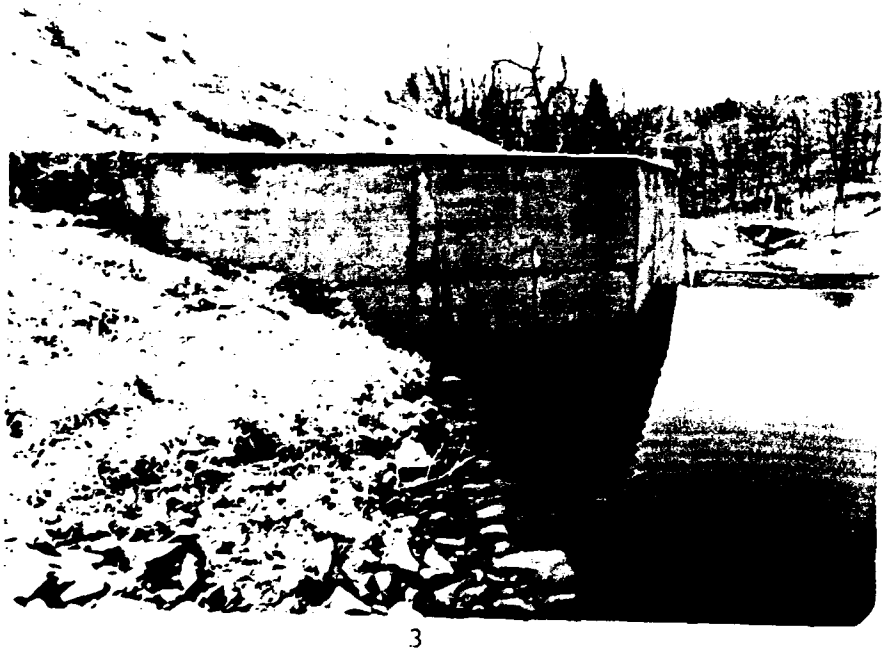
PHOTOGRAPH 3 View of minor cracking in the left spillway wingwall.

PHOTOGRAPH 4 View of the control tower riser located along the upstream embankment slope.

1



2



3

4

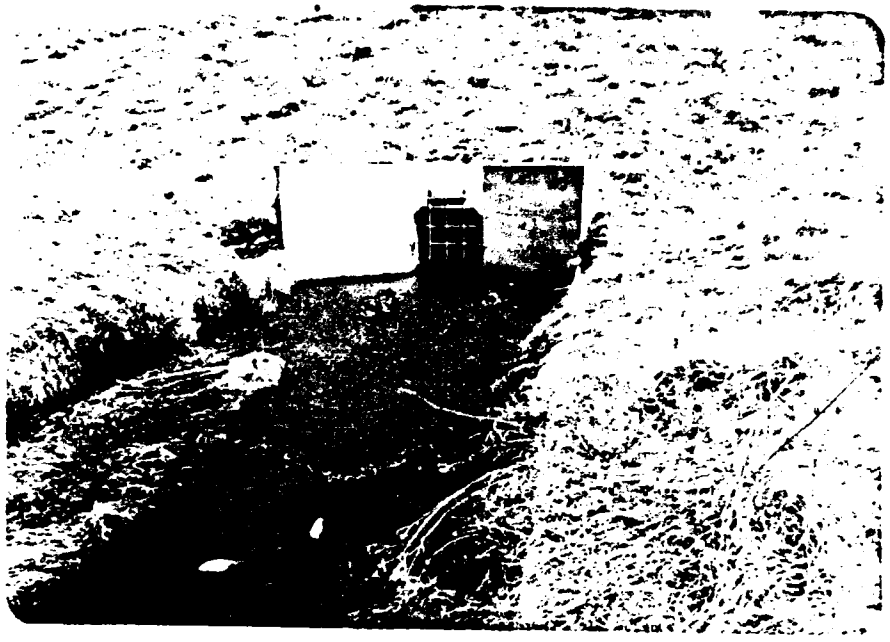
PHOTOGRAPH 5 Interior view of the control tower riser and slide gate operator.

PHOTOGRAPH 6 View of the outlet structure located at the downstream embankment toe.

PHOTOGRAPH 7 View of the area immediately downstream of the embankment as seen from the embankment crest.

PHOTOGRAPH 8 View of the first downstream residence in the valley below the dam located approximately one mile from the embankment.

5



6

7

8

APPENDIX D

HYDROLOGY AND HYDRAULICS ANALYSES

PREFACE

The modified HEC-1 program is capable of performing two basic types of hydrologic analyses: 1) the evaluation of the overtopping potential of the dam; and 2) the estimation of the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. Briefly, the computational procedures typically used in the dam overtopping analysis are as follows:

a. Development of an inflow hydrograph(s) to the reservoir.

b. Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.

c. Routing of the outflow hydrograph(s) from the reservoir to desired downstream locations. The results provide the peak discharge(s), time(s) of the peak discharge(s), and the maximum stage(s) of each routed hydrograph at the downstream end of each reach.

The evaluation of the hydrologic-hydraulic consequences resulting from an assumed structural failure (breach) of the dam is typically performed as shown below.

a. Development of an inflow hydrograph(s) to the reservoir.

b. Routing of the inflow hydrograph(s) through the reservoir.

c. Development of a failure hydrograph(s) based on specified breach criteria and normal reservoir outflow.

d. Routing of the failure hydrograph(s) to desired downstream locations. The results provide estimates of the peak discharge(s), time(s) to peak and maximum water surface elevations of failure hydrographs for each location.

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: ROSE VALLEY LAKE DAM

PROBABLE MAXIMUM PRECIPITATION (PMP) = 22.2 INCHES/24 HOURS (1)

STATION	1	2	3
STATION DESCRIPTION	Rose Valley Lake Dam		
DRAINAGE AREA (SQUARE MILES)	3.4		
CUMULATIVE DRAINAGE AREA (SQUARE MILES)	-		
ADJUSTMENT OF PMF FOR DRAINAGE AREA LOCATION (%)(1)			
6 HOURS	118		
12 HOURS	127		
24 HOURS	136		
48 HOURS	143		
72 HOURS	145		
SNYDER HYDROGRAPH PARAMETERS			
ZONE (2)	17		
C_p (3)	0.45		
C_t (3)	1.13		
L' (MILES) (4)	1.2		
$t_p = C_t (L')^{0.6}$ (HOURS)	1.26		
SPILLWAY DATA			
CREST LENGTH (FEET)	80		
FREEBOARD (FEET)	6.0		

(1) HYDROMETEOROLOGICAL REPORT 40, U.S. Weather Bureau, 1965.

(2) HYDROLOGIC ZONE DEFINED BY CORPS OF ENGINEERS, BALTIMORE DISTRICT, FOR DETERMINATION OF SNYDER COEFFICIENTS (C_p AND C_t).

(3) SNYDER COEFFICIENTS

(4) L' = LENGTH OF LONGEST WATERCOURSE FROM RESERVOIR INLET TO BASIN DIVIDE.

SUBJECT DAM SAFETY INSPECTION
ROSE VALLEY LAKE DAM

BY DJS DATE 5-22-79 PROJ. NO. 79-203-127

CHKD. BY WJV DATE 6-12-80 SHEET NO. 1 OF 13

GAI CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists

DAM STATISTICS

- HEIGHT OF DAM = 26 FT (FIELD MEASURED: INVERT OF OUTLET TO LOW TOP OF DAM)

- NORMAL POOL STORAGE CAPACITY = 3940 AC-FT (SHEET 3)
- DESIGN FLOOD POOL STORAGE CAPACITY = 6260 AC-FT (SHEET 3)
- MAXIMUM POOL STORAGE CAPACITY = 6500 AC-FT (SHEET 3)
  (@ LOW TOP OF DAM)

- DRAINAGE AREA = 3.4 SQ. MI. (PLANIMETERED ON USGS 7.5' TOPO QUADS: BOONES, MONTOURSVILLE NORTH, AND TROUT RUN, PA)

ELEVATIONS:

TOP OF DAM (DESIGN)	= 1241.0	(FIG. 3)
TOP OF DAM (FIELD)	= 1241.0	
DESIGN FLOOD POOL	= 1240.5	(SHEET 4)
NORMAL POOL	= 1235.0	(SHEET 4)
SPILLWAY CREST	= 1235.0	(FIG. 6)
UPSTREAM INLET INVERT	= 1215.5	(FIG. 10)
DOWNSTREAM OUTLET INVERT (DESIGN)	= 1215.0	(FIG. 10)
DOWNSTREAM OUTLET INVERT (FIELD)	= 1215.0	
STREAMBED @ DAM CENTERLINE	= 1215	(ESTIMATED, FIG. 3)

SUBJECT DAM SAFETY INSPECTION
ROSE VALLEY LAKE DAM

BY JJS DATE 5-30-80 PROJ. NO. 79-303-127

CHKD. BY WJV DATE 6-12-80 SHEET NO. 2 OF 13

CONSULTANTS, INC
Engineers • Geologists • Planners
Environmental Specialists

DAM CLASSIFICATION

DAM SIZE : INTERMEDIATE (REF 1, TABLE 1)

HAZARD CLASSIFICATION : HIGH (FIELD OBSERVATION)

REQUIRED SDF : PMF (REF 1, TABLE 3)

HYDROGRAPH PARAMETERS

LENGTH OF LONGEST WATERCOURSE FROM RESERVOIR INLET TO BASIN DIVIDE : $L' = 1.2$ MILES (MEASURED ON USGS TOPO QUADS: BODINES, MONTOURSVILLE NORTH, AND TROUT RUN, PA)

$C_p = 1.45$
$C_t = 1.13$ (SNYDER PARAMETERS SUPPLIED BY C.O.E.; ZONE 17, SUSQUEHANNA RIVER BASIN)

SNYDER'S STANDARD LAG = $C_t (L')^{0.6}$

$t_p = 1.13 (1.2)^{0.6} = 1.26$ HRS

NOTE : SINCE L_{CA}, THE LENGTH OF THE LONGEST WATERCOURSE FROM THE DAM TO A POINT OPPOSITE THE BASIN CENTROID, IS LESS THAN THE LENGTH OF THE RESERVOIR (BY INSPECTION; SEE FIGURE 1), THE SNYDER STANDARD LAG IS ESTIMATED AS $t_p = C_t (L')^{0.6}$ HOURS (AS PER C.O.E.). HYDROGRAPH VARIABLES USED HERE ARE DEFINED IN REF 2, IN SECTION ENTITLED "SNYDER SYNTHETIC UNIT HYDROGRAPH."

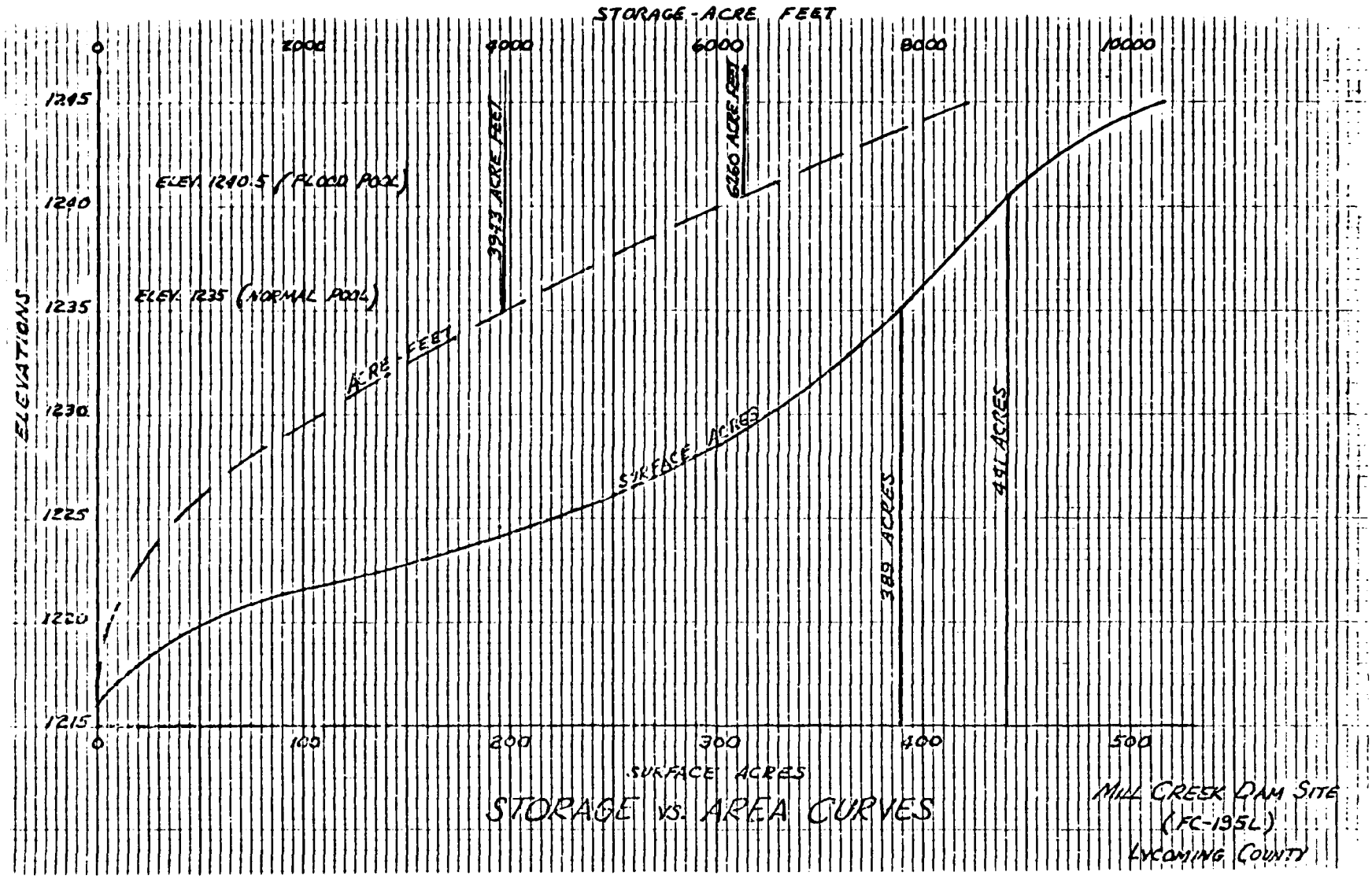
JBJECT DAM SAFETY INSPECTION
ROSE VALLEY LAKE DAM
BY JJS DATE 5-27-80 PROJ. NO. 78-303-167
CHKD. BY WJV DATE 6-12-80 SHEET NO. 3 OF 13

CONSULTANTS, IN
Engineers • Geologists • Planners
Environmental Specialists

ELEVATION-STORAGE RELATIONSHIP

THE FOLLOWING ELEVATION-STORAGE VALUES ARE TAKEN FROM THE STORAGE-AREA CURVES (PROVIDED BY OWNER) GIVEN ON SHEET 4.

	RESERVOIR ELEVATION (FT)	STORAGE (AC-FT)
	1215.5	0
	1220.0	130
	1225.0	780
	1230.0	2160
(NORMAL POOL)	1235.0	3943
	1236.0	4330
	1237.0	4740
	1238.0	5160
	1239.0	5590
	1240.0	6030
(DESIGN FLOOD POOL)	1240.5	6260
(LOW TOP OF DAM)	1241.0	6500
	1242.0	6980
	1243.0	7470
	1244.0	7960
	1245.0	8450


STORAGE - ACRE FEET
0
2000
4000
6000
8000
10000
ELEVATIONS
1245
1240
1235
1230
1225
1220
1215
ELEV. 1240.5 (FLOOD POOL)
ELEV. 1235 (NORMAL POOL)
3973 ACRE FEET
6260 ACRE FEET
ACRE-FEET
SURFACE ACRES
385 ACRES
491 ACRES
0
100
200
300
400
500
SURFACE ACRES
STORAGE VS. AREA CURVES
MILL CREEK DAM SITE
(FC-195L)
LYCOMING COUNTY

4/3

JBJECT DAM SAFETY INSPECTION
ROSE VALLEY LAKE DAM

BY JJS DATE 5-27-80 PROJ. NO. 79-303-127

CHKD. BY WJV DATE 6-12-80 SHEET NO. 5 OF 13

gai CONSULTANTS, IN
Engineers • Geologists • Planners
Environmental Specialists

PMP CALCULATIONS

- FROM REF 9, FIG. 2, OBTAIN PMP VALUE FOR A BASIN OF DRAINAGE AREA 200 SQUARE MILES, AND A DURATION OF 24 HOURS:

P = 22.2 INCHES

- FROM REF 9, FIG. 1, THE GEOGRAPHIC ADJUSTMENT FACTOR = 100%
(LOCATION N 41° 33.7', W 76° 59.9')

- AREA CORRECTION FACTOR (REF 9):

DURATION (HRS):	6	12	24	48	72
FACTOR (%):	117.5	127.0	136.0	142.5	145.0

- TOTAL CORRECTION FACTOR (100% × AREA CORRECTION FACTOR)

DURATION (HRS):	6	12	24	48	72
FACTOR (%):	118	127	136	143	145

- HOP BROOK FACTOR (ADJUSTMENT FOR BASIN SHAPE AND FOR THE LESSER LIKELIHOOD OF A SEVERE STORM CENTERING OVER A SMALL BASIN) FOR A DRAINAGE AREA OF 3.4 SQUARE MILES IS 0.83

(REF 4, p. 48)

JBJECT DAM SAFETY INSPECTION
ROSE VALLEY LAKE DAM

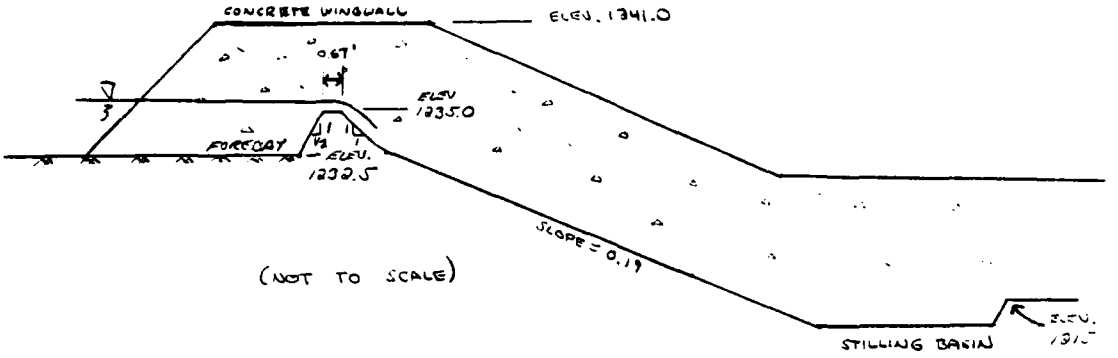
BY JJS DATE 5-27-80 PROJ. NO. 79-303-137

CHKD. BY WJV DATE 6-12-80 SHEET NO. 6 OF 13

CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists

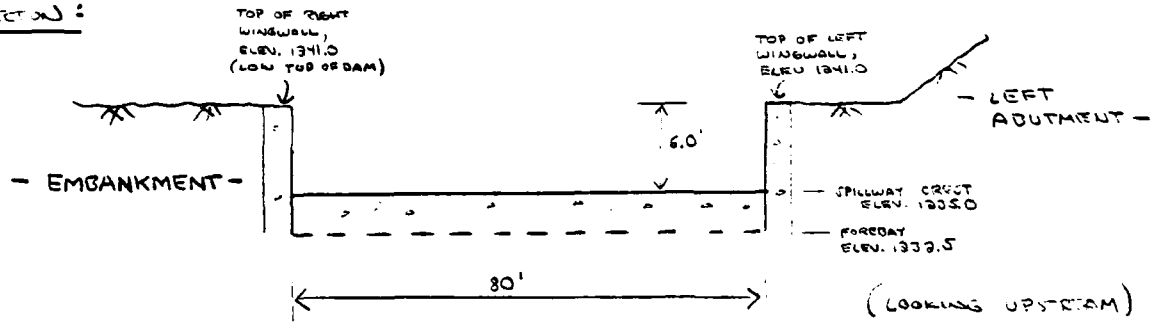
SPILLWAY CAPACITY

PROFILE:



(NOT TO SCALE)

CROSS-SECTION:



(LOOKING UPSTREAM)

(NOT TO SCALE)

(SKETCHES BASED ON FIELD MEASUREMENTS AND DESIGN DRAWINGS, FIGS. 6-9)

UBJECT DAM SAFETY INSPECTION
ROSE VALLEY LAKE DAM

BY DJS DATE 6-5-80 PROJ. NO. 79-303-137

CHKD. BY WJV DATE 6-12-80 SHEET NO. 7 OF 13

gai CONSULTANTS, IN
Engineers • Geologists • Planners
Environmental Specialists

THE SPILLWAY CONSISTS OF A RECTANGULAR CONCRETE CHUTE CHANNEL WITH DISCHARGES CONTROLLED BY A FLAT-CRESTED TRAPEZOIDAL-SHAPED WEIR. DISCHARGE OVER THE WEIR CAN BE ESTIMATED BY THE RELATIONSHIP

$$Q = CLH^{3/2} \qquad \text{(REF 5, p. 5-23)}$$

WHERE Q = DISCHARGE, IN CFS,
C = DISCHARGE COEFFICIENT,
L = LENGTH OF WEIR CREST = 80 FT,
H = HEAD, IN FT.

THE COEFFICIENT OF DISCHARGE CORRESPONDING TO A HEAD OF 1.5 FT IS 3.82 (REF 5, TABLE 5-9). AS THE HEAD ON THE WEIR BECOMES SMALL, DISCHARGE IS REDUCED DISPROPORTIONATELY, DUE TO THE ROUGHNESS AND THE CONTACT PRESSURE BETWEEN THE WATER AND THE WEIR SURFACE. THUS, THE DISCHARGE COEFFICIENT (C) TAKES ON A LOWER VALUE. THE OPPOSITE TREND OCCURS FOR INCREASING HEADS. THEREFORE, THE DISCHARGE COEFFICIENT WILL BE ADJUSTED ACCORDING TO FIG. 250, REF 4, ASSUMING THAT THE RELATIONSHIPS FOR OGEE WEIRS CAN BE APPLIED TO THIS TRAPEZOIDAL-SHAPED WEIR.

AT LOW TOP OF DAM, EL. 1341.0,

$H_1 = 6.0$ FT,

ASSUMING $H_0 = 1.5$ FT (SEE ABOVE),

$$\frac{H}{H_0} = \frac{6}{1.5} = \underline{4.0}.$$

FROM FIG. 250, REF 4, $C/C_0 = 1.07$; ASSUMING $C_0 = 3.82$,

$$C = 1.07 \times 3.82 = \underline{4.09}$$

$$\therefore Q_{INITIAL} = (4.09)(80)(6)^{3/2} = \underline{4809} \text{ CFS}$$

UBJECT DAM SAFETY INSPECTION
ROSE VALLEY LAKE DAM

BY DTS DATE 6-5-80 PROJ. NO. 79-209-127

CHKD. BY WJV DATE 6-12-80 SHEET NO. 8 OF 13

GAI CONSULTANTS, INC
Engineers • Geologists • Planners
Environmental Specialists

→ ESTIMATE APPROACH CHANNEL LOSSES AT ELEV. 1241.0 :

- AVG. LENGTH OF APPROACH CHANNEL = 210 FT (FIG. 3)

- AVG. DEPTH OF APPROACH CHANNEL = H + P
= 6.0 + 2.5 = 8.5 FT

- AVG. WIDTH OF APPROACH CHANNEL = 145 FT (FIG. 3)

- RIGHT SIDE-WALL → VERTICAL
- LEFT SIDE-SLOPE = 2H : 1V (FIG. 7)

- AVERAGE HEIGHT OF RIGHT SIDEWALL = $[(10 \times 8.5) + (27 \times \frac{8.5}{2})] / 37$
= 5.4 FT

- AVERAGE FLOW AREA IN APPROACH CHANNEL = $(145 \times 8.5) + [\frac{1}{2} \times (2 \times 8.5)(8.5)]$
= 1305 FT²

- AT ELEV. 1241.0, H_1 = 6.0,

Q = 4809 CFS (SEE SHEET 7)

- AVG. VELOCITY IN APPROACH CHANNEL →
$V_a = \frac{Q}{A} = \frac{4809}{1305} = 3.7$ FT/SEC

- AVG. APPROACH VELOCITY HEAD →

$$h_a = \frac{V_a^2}{2g} = \frac{3.7^2}{64.4} = 0.2 \text{ FT}$$

- ASSUMING THE APPROACH CHANNEL ENTRANCE LOSS = $0.1\, h_a$, (REF 4, p. 37),

h_E = ENTRANCE LOSS = (0.1)(0.2) = 0.02 FT

UBJECT DAM SAFETY INSPECTION

ROSE VALLEY LAKE DAM

BY JJS DATE 6-5-80 PROJ. NO. 79-303-127

CHKD. BY WJV DATE 6-12-80 SHEET NO. 9 OF 13

GAI CONSULTANTS, IN

Engineers • Geologists • Planners
Environmental Specialists

APPROACH CHANNEL FRICTION LOSS, h_F:

$$h_F = \left[\frac{V_a n}{(1.49) R^{2/3}}\right]^2 \times L$$

WHERE L = APPROACH CHANNEL LENGTH = 210 FT,
n = MANNING'S ROUGHNESS COEFFICIENT = 0.040 (FIELD ESTIMATE),
R = HYDRAULIC RADIUS = FLOW AREA / WETTED PERIMETER.

WETTED PERIMETER = $P_w = 145 + 5.4 + \sqrt{(8.5)^2 + (2 \times 8.5)^2}$
$= \underline{169.4}$ FT

$\therefore R = \frac{1305 \text{ FT}^2}{169.4 \text{ FT}} = \underline{7.7}$ FT

$$h_F = \left[\frac{(3.7)(0.040)}{(1.49)(7.7)^{2/3}}\right]^2 \times 210 = \underline{0.14} \text{ FT}$$

$\therefore$ TOTAL APPROACH LOSS = $h_E + h_F = 0.02 + 0.14$
$= \underline{0.16}$ FT

- ACTUAL EFFECTIVE HEAD = $6.0 - 0.16 = \underline{5.84}$ FT

$\therefore$ @ ELEV 1241.0, SPILLWAY CAPACITY $\Rightarrow$

$$Q = (4.09)(80)(5.84)^{1.5} = 4618 = \underline{4620} \text{ CFS}$$

- FOR HEADS OTHER THAN 6.0, APPROACH CHANNEL LOSSES WILL BE ASSUMED TO BE PROPORTIONAL TO THAT AT $H = 6.0$:

$$h_L = 0.16 \left(\frac{H}{6.0}\right)$$

WHERE h_L = TOTAL APPROACH CHANNEL LOSS, IN FT,
H = RESERVOIR ELEVATION - 1235.0.

SUBJECT DAM SAFETY INSPECTION
ROSE VALLEY LAKE DAM

BY DDS DATE 6-6-80 PROJ. NO. 79-203-127

CHKD. BY WJV DATE 6-12-80 SHEET NO. 10 OF 13

GAI CONSULTANTS, INC
Engineers • Geologists • Planners
Environmental Specialists

SPILLWAY RATING TABLE

	RESERVOIR ELEVATION (FT)	H (FT)	① H/H_o	② C/C_o	③ C	④ H/H_1	⑤ h_L (FT)	⑥ He (FT)	⑦ Q CFS
	1235.0	—	—	—	—	—	—	—	0
	1236.0	1.0	—	—	3.52	0.17	0.03	0.97	370
	1237.0	2.0	1.33	1.04	3.97	0.33	0.05	1.95	860
	1238.0	3.0	2.00	1.07	4.09	0.50	0.08	2.92	1630
	1239.0	4.0	2.67	1.07	4.09	0.67	0.11	3.89	2510
	1240.0	5.0	3.33	1.07	4.09	0.83	0.13	4.87	3520
(DESIGN FLOOD POOL)	1240.5	5.5	3.67	1.07	4.09	0.92	0.15	5.35	4050
(LOW TOP OF DAM)	1241.0	6.0	4.00	1.07	4.09	1.00	0.16	5.84	4620
	1241.5	6.5	4.33	1.07	4.09	1.08	0.17	6.33	5210
	1242.0	7.0	4.67	1.07	4.09	1.17	0.19	6.81	5810
	1242.5	7.5	5.00	1.07	4.09	1.25	0.20	7.30	6450
	1243.0	8.0	5.33	1.07	4.09	1.33	0.21	7.79	7110
	1244.0	9.0	6.00	1.07	4.09	1.50	0.24	8.76	8480
	1245.0	10.0	6.67	1.07	4.09	1.67	0.27	9.73	9930

① H_o = DESIGN HEAD ; ASSUME H_o = 1.5 FT (SEE SHEET 7).

② FROM REF 4, FIG. 250.

③ $C = (C/C_o) \times 3.82$; AT $H = 1.0$, $C = 3.52$, FROM REF 5, TABLE 5-9.

④ H_1 = 6.0 FT (SEE SHEETS 7-9).

⑤ $h_L = 0.16 (H/H_1)$

⑥ He = EFFECTIVE HEAD = $H - h_L$

⑦ $Q = CLH_e^{3/2}$, L = 90 FT.

JBJECT DAM SAFETY INSPECTION
ROSE VALLEY LAKE DAM

BY DJS DATE 5-29-80 PROJ. NO. 79-203-127

CHKD. BY WJV DATE 6-12-80 SHEET NO. 11 OF 13

CONSULTANTS, INC
Engineers • Geologists • Planners
Environmental Specialists

EMBANKMENT RATING CURVE

ASSUME THAT THE EMBANKMENT BEHAVES ESSENTIALLY AS A BROAD-CRESTED WEIR WHEN OVERTOPPING OCCURS. THUS, THE DISCHARGE CAN BE ESTIMATED BY THE RELATIONSHIP

$$Q = CLH^{3/2} \qquad \text{(REF 5, p. 5-23)}$$

WHERE Q = DISCHARGE OVER EMBANKMENT, IN CFS,
L = LENGTH OF EMBANKMENT OVERTOPPED,
H = HEAD; IN THIS CASE IT IS THE AVERAGE "FLOW-AREA" WEIGHTED HEAD ABOVE THE CREST, WITH THE LOW TOP OF DAM AS THE DATUM;
C = COEFFICIENT OF DISCHARGE, DEPENDENT UPON THE HEAD AND THE WEIR BREADTH.

LENGTH OF EMBANKMENT INUNDATED VS RESERVOIR ELEVATION:

RESERVOIR ELEVATION (FT)	EMBANKMENT LENGTH (FT)
1241.0	0
1241.1	35
1241.4	110
1241.5	335
1242.0	390
1242.5	440
1243.0	445
1244.0	460
1245.0	470

(BASED ON FIELD SURVEY ... USGS 7½' QUAD - BOONES ... RT SIDE-SLOPES = 9:1, LT SIDE-SLOPES = 4:1.)

JBJECT DAM SAFETY INSPECTION

ROSE VALLEY LAKE DAM

BY DJS DATE 5-29-80 PROJ. NO. 79-303-127

CHKD. BY WJV DATE 6-12-80 SHEET NO. 12 OF 13

gai CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists

ASSUME THAT INCREMENTAL DISCHARGES OVER THE EMBANKMENT FOR SUCCESSIVE RESERVOIR ELEVATIONS ARE APPROXIMATELY TRAPEZOIDAL IN CROSS-SECTIONAL FLOW AREA. THEN ANY INCREMENTAL AREA OF FLOW CAN BE ESTIMATED AS $H_i [(L_1+L_2)/2]$, WHERE L_1 = LENGTH OF OVERTOPPED EMBANKMENT AT HIGHER ELEVATION, L_2 = LENGTH AT LOWER ELEVATION, H_i = DIFFERENCE IN ELEVATIONS. THUS, THE TOTAL AVERAGE "FLOW-AREA" WEIGHTED HEAD CAN BE ESTIMATED AS $H_w = (\text{TOTAL FLOW AREA}/L_1)$.

EMBANKMENT RATING TABLE :

RESERVOIR ELEVATION (FT)	L_1 (FT)	L_2 (FT)	INCREMENTAL HEAD, H_i (FT)	① INCREMENTAL FLOW AREA, A_i (FT^2)	TOTAL FLOW AREA, A_T (FT^2)	② WEIGHTED HEAD, H_w (FT)	③ H_w/l	④ C	⑤ Q (CFS)
1241.0	0	—	—	—	—	—	—	—	0
1241.1	35	0	0.1	2	2	0.1	0.01	2.93	0
1241.4	110	35	0.3	22	24	0.2	0.01	2.97	30
1241.5	335	110	0.1	22	46	0.1	0.01	2.93	30
1242.0	390	335	0.5	181	227	0.6	0.04	3.03	550
1242.5	440	390	0.5	208	435	1.0	0.07	3.03	1330
1243.0	445	440	0.5	221	656	1.5	0.10	3.04	2490
1244.0	460	445	1.0	453	1109	2.4	0.16	3.06	5230
1245.0	470	460	1.0	465	1574	3.3	0.22	3.08	8630

① $A_i = H_i [(L_1+L_2)/2]$

② $H_w = (A_T/L_1)$

③ l = BREADTH OF CREST = 15 FT (FIELD MEASURED)

④ $C = f(H, l)$; FROM REF 12, FIG. 24.

⑤ $Q = CL_1 H_w^{3/2}$

SUBJECT DAM SAFETY INSPECTION

ROSE VALLEY LAKE DAM

BY RJS DATE 6-6-80 PROJ. NO. 79-203-127

CHKD. BY WJV DATE 6-12-90 SHEET NO. 13 OF 13

gai CONSULTANTS, IN

Engineers • Geologists • Planners
Environmental Specialists

TOTAL FACILITY RATING TABLE

	RESERVOIR ELEVATION (FT)	$Q_{SPILLWAY}$ (CFS)	$Q_{EMBANKMENT}$ (CFS)	Q_{TOTAL} (CFS)
	1235.0	0	–	0
	1236.0	270	–	270
	1237.0	860	–	860
	1238.0	1630	–	1630
	1239.0	2510	–	2510
	1240.0	3520	–	3520
(DESIGN FLOOD POOL)	1240.5	4050	–	4050
(LOW TOP OF DAM)	1241.0	4620	0	4620
	1241.5	5210	30	5240
	1242.0	5810	550	6360
	1242.5	6450	1330	7780
	1243.0	7110	2490	9600
	1244.0	8480	5230	13,710
	1245.0	9930	8680	18,610

OVERTOPPING ANALYSIS

DAM SAFETY INSPECTION
ROSE VALLEY LAKE DAM *** OVERTOPPING ANALYSIS ***
15-MINUTE TIME STEP AND 72-HOUR STORM DURATION

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
288	0	15	0	0	0	0	0	0	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 4 LRTIO= 1
RTIOS= .50 .80 .90 1.00

****

SUB-AREA RUNOFF COMPUTATION

RESERVOIR INFLOW COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	JAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	3.40	0.00	3.40	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.20	118.00	127.00	136.00	143.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

INITIAL & CONSTANT RAINFALL LOSSES AS PER C.O.E.

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 1.26 CP= .45 NTA= 0

BASE FLOW PARAMETERS AS PER C.O.E.

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 5.46 AND R= 7.86 INTERVALS

UNIT HYDROGRAPH 45 END-OF-PERIOD ORDINATES, LAG= 1.26 HOURS, CP= .45 VOL= 1.00

58.	216.	432.	637.	767.	778.	703.	619.	545.	480.
423.	372.	328.	288.	254.	224.	197.	173.	153.	134.
118.	104.	92.	81.	71.	63.	55.	49.	43.	38.
33.	29.	26.	23.	20.	18.	15.	14.	12.	11.
9.	8.	7.	6.	6.					

SUMMARY INPUT/OUTPUT

SUBJECT DAM SAFETY INSPECTION
ROSE VALLEY LAKE DAM
BY DLB DATE 6-12-80 PROJ. NO. 19-303-137
CHKD. BY DLB DATE 6-13-80 SHEET NO. A OF C

CONSULTANTS, INC
Engineers • Geologists • Planners
Environmental Specialists

SUBJECT DAM SAFETY INSPECTION

ROSE VALLEY LAKE DAM

BY DRS DATE 6-12-80 PROJ. NO. 79-203-127

CHKD. BY DLB DATE 6-13-80 SHEET NO. B OF C

CONSULTANTS, INC
Engineers • Geologists • Planners
Environmental Specialists

O MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	25.75	23.14	2.61	205972.
										(654.)(	588.)(	66.)(	5832.48)

RESERVOIR INFLOW (PMF)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	9341.	6191.	2091.	715.	205969.
CMS	265.	175.	59.	20.	5832.
INCHES		16.94	22.88	23.48	23.48
MM		430.27	581.27	596.40	596.40
AC-FT		3070.	4148.	4256.	4256.
THOUS CU M		3787.	5116.	5249.	5249.

HYDROGRAPH ROUTING

ROUTE THROUGH RESERVOIR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
101	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	3940.	-1

STAGE	1235.00	1236.00	1237.00	1238.00	1239.00	1240.00	1240.50	1241.00	1241.50
	1242.50	1243.00	1244.00	1245.00					
FLOW	0.00	270.00	860.00	1630.00	2510.00	3520.00	4050.00	4620.00	5240.00
	7780.00	9600.00	13710.00	18610.00					
CAPACITY=	0.	130.	780.	2160.	3943.	4330.	4740.	5160.	5590.	6030.
	6260.	6500.	6980.	7470.	7960.	8450.			
ELEVATION=	1216.	1220.	1225.	1230.	1235.	1236.	1237.	1238.	1239.	1240.
	1241.	1241.	1242.	1243.	1244.	1245.			

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1235.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMID
1241.0	0.0	0.0	0.

PEAK OUTFLOW IS 4059. AT TIME 43.75 HOURS

ROSE VALLEY LAKE OUTFLOW (PMF)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4059.	3610.	1842.	666.	191677.
CMS	115.	102.	52.	19.	5428.
INCHES		9.88	20.16	21.85	21.85
MM		250.88	512.02	555.01	555.01
AC-FT		1790.	3654.	3960.	3960.
THOUS CU M		2208.	4507.	4885.	4885.

SUMMARY OF DAM SAFETY ANALYSIS

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1234.99	1235.00	1241.00
STORAGE	3940.	3943.	6500.
OUTFLOW	0.	0.	4620.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	1238.12	0.00	5211.	1733.	0.00	44.25	0.00
.80	1239.60	0.00	5854.	3115.	0.00	44.00	0.00
.90	1240.06	0.00	6059.	3587.	0.00	44.00	0.00
1.00	1240.51	0.00	6264.	4059.	0.00	43.75	0.00

SUBJECT DAM SAFETY INSPECTION

ROSE VALLEY LAKE DAM

BY JJJ DATE 6-12-80 PROJ. NO. 79-203-137

CHKD. BY DLB DATE 6-13-80 SHEET NO. C OF C

CONSULTANTS, INC
Engineers • Geologists • Planners
Environmental Specialists

LIST OF REFERENCES

1. "Recommended Guidelines for Safety Inspection of Dams," prepared by Department of the Army, Office of the Chief of Engineers, Washington, D. C. (Appendix D).

2. "Unit Hydrograph Concepts and Calculations," by Corps of Engineers, Baltimore District (L-519).

3. "Seasonal Variation of Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1,000 Square Miles and Duration of 6, 12, 24, and 48 Hours," Hydrometeorological Report No. 33, prepared by J. T. Riedel, J. F. Appleby and R. W. Schloemer, Hydrologic Service Division Hydrometeorological Section, U. S. Department of the Army, Corps of Engineers, Washington, D. C., April 1956.

4. Design of Small Dams, U. S. Department of the Interior, Bureau of Reclamation, Washington, D. C., 1973.

5. Handbook of Hydraulic, H. W. King and E. F. Brater, McGraw-Hill, Inc., New York, 1963.

6. Standard Handbook for Civil Engineers, F. S. Merritt, McGraw-Hill, Inc., New York, 1968.

7. Open-Channel Hydraulics, V. T. Chow, McGraw-Hill, Inc., New York, 1959.

8. Weir Experiments, Coefficients, and Formulas, R. E. Horton, Water Supply and Irrigation Paper No. 200, Department of the Interior, United States Geological Survey, Washington, D. C., 1907.

9. "Probable Maximum Precipitation Susquehanna River Drainage Above Harrisburg, Pennsylvania," Hydrometeorological Report 40, prepared by H. V. Goodyear and J. T. Riedel, Hydrometeorological Branch Office of Hydrology, U. S. Weather Bureau, U. S. Department of Commerce, Washington, D. C., May 1965.

10. Flood Hydrograph Package (HEC-1) Dam Safety Version, Hydrologic Engineering Center, U. S. Army, Corps of Engineers, Davis, California, July 1978.

11. "Simulation of Flow Through Broad Crest Navigation Dams with Radial Gates," R. W. Schmitt, U. S. Army, Corps of Engineers, Pittsburgh District.

12. "Hydraulics of Bridge Waterways," BPR, 1970, Discharge Coefficient Based on Criteria for Embankment Shaped Weirs, Figure 24, page 46.

13. Applied Hydraulics in Engineering, Morris, Henry M. and Wiggert, James N., Virginia Polytechnic Institute and State University, 2nd Edition, The Ronald Press Company, New York, 1972.

14. Standard Mathematical Tables, 21st Edition, The Chemical Rubber Company, 1973, page 15.

15. Engineering Field Manual, U. S. Department of Agriculture, Soil Conservation Service, 2nd Edition, Washington, D. C. 1969.

16. Water Resources Engineering, R. K. Linsley and J. B. Franzini, McGraw-Hill, Inc., New York, 1972.

17. Engineering for Dams, Volume 2, W. P. Creager, J. D. Justin, J. Hinds, John Wiley & Sons, Inc., New York, 1964.

APPENDIX E

FIGURES

LIST OF FIGURES

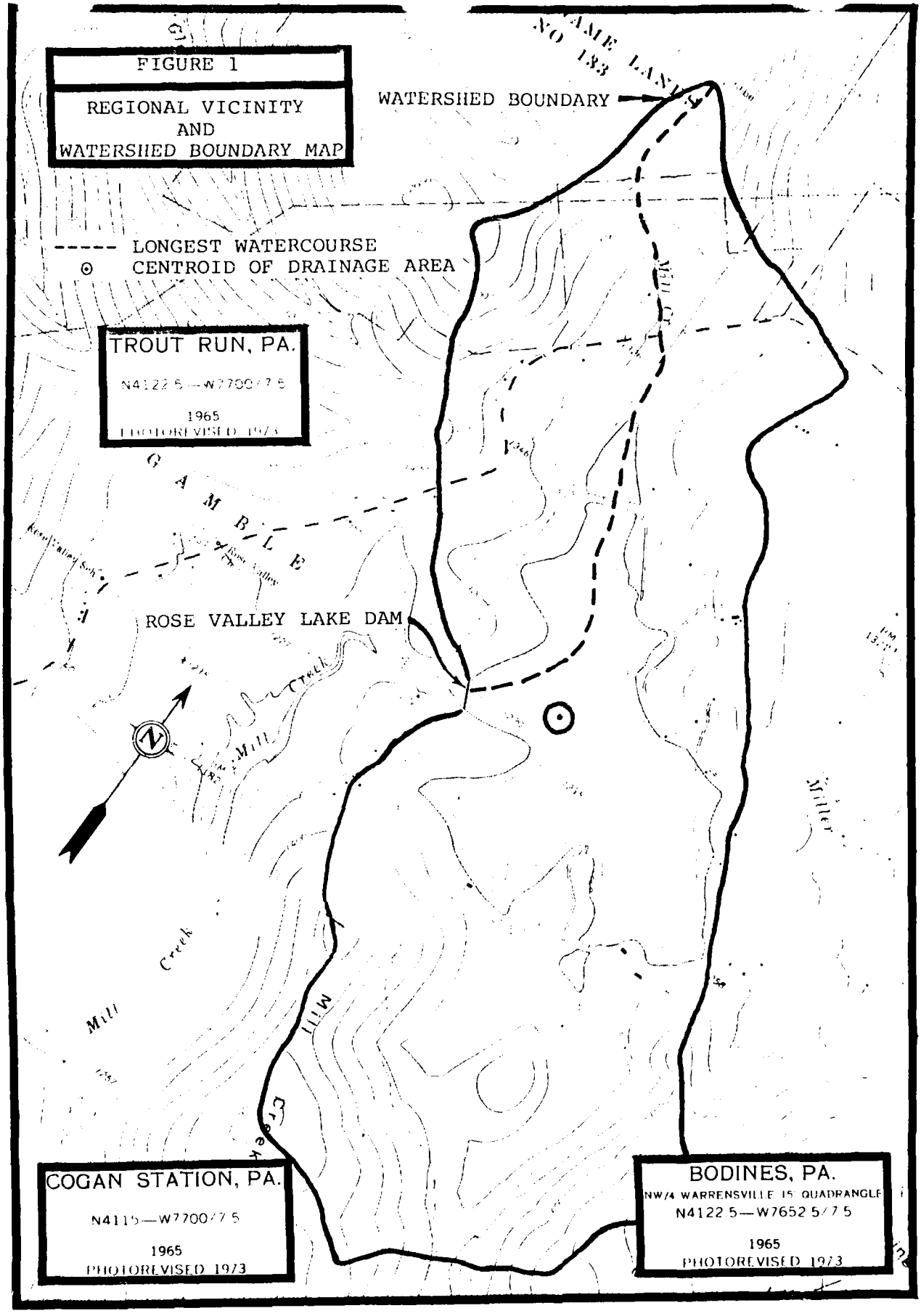
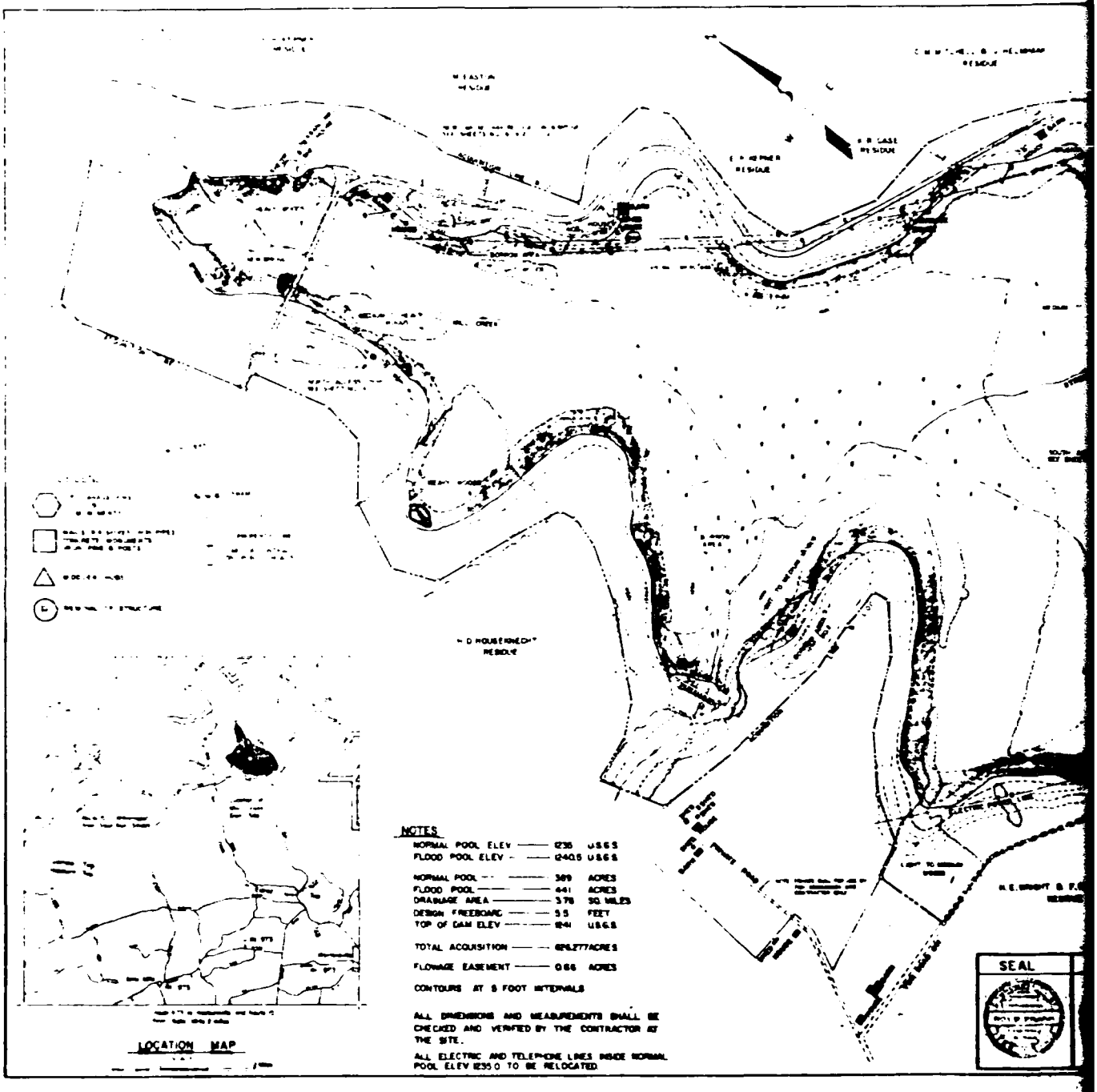
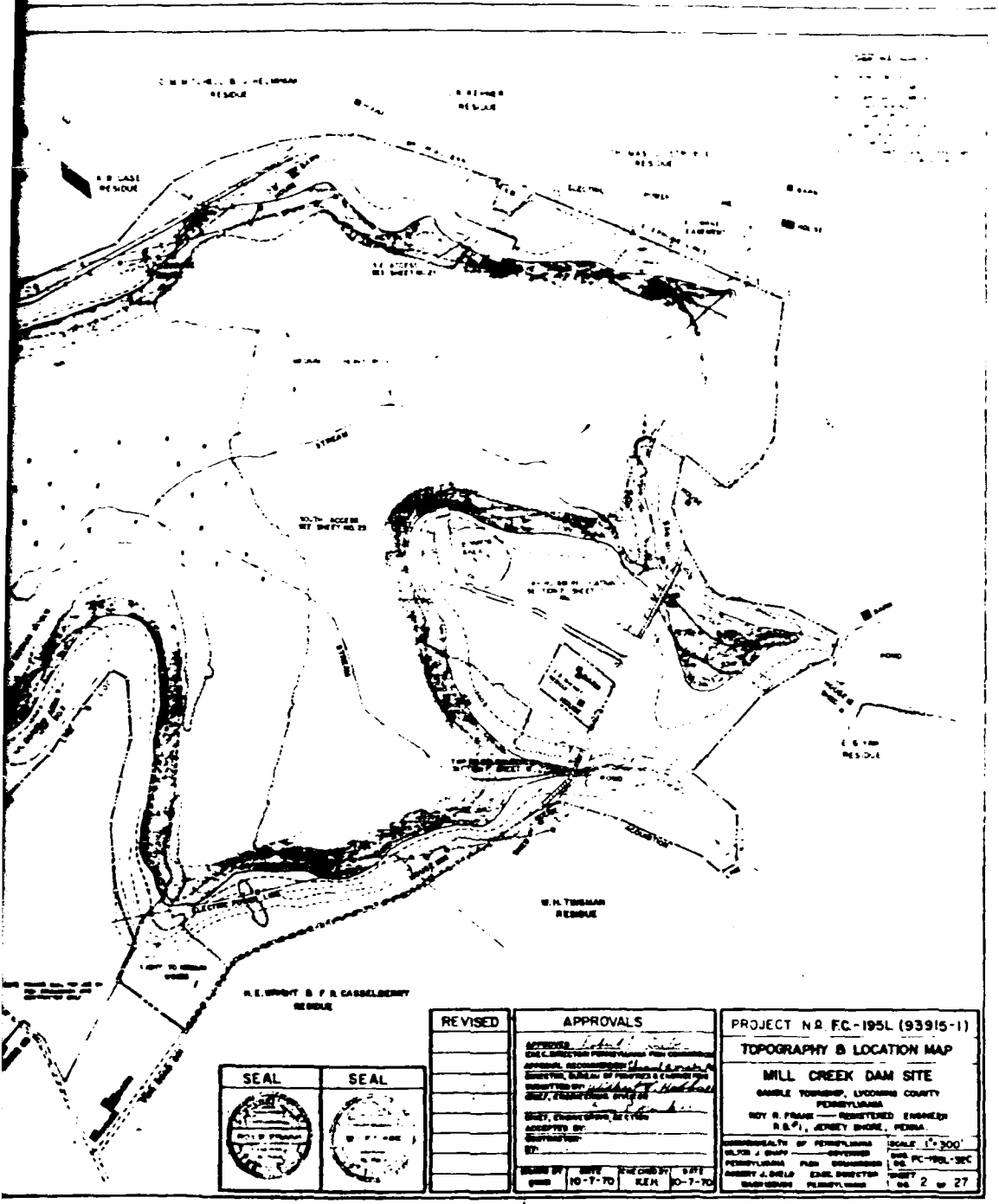


FIGURE 1
REGIONAL VICINITY
AND
WATERSHED BOUNDARY MAP
WATERSHED BOUNDARY
----- LONGEST WATERCOURSE
⊙ CENTROID OF DRAINAGE AREA
TROUT RUN, PA.
N4122 5—W7700 7 5
1965
PHOTOREVISED 1973
GAMBLE
ROSE VALLEY LAKE DAM
Mill Creek
Miller
COGAN STATION, PA.
N4115—W7700 7 5
1965
PHOTOREVISED 1973
BODINES, PA.
NW/4 WARRENSVILLE 15' QUADRANGLE
N4122 5—W7652 5 7 5
1965
PHOTOREVISED 1973


NOTES
NORMAL POOL ELEV —— 1235 USGS
FLOOD POOL ELEV —— 1240.5 USGS
NORMAL POOL —— 389 ACRES
FLOOD POOL —— 441 ACRES
DRAINAGE AREA —— 3.78 SQ. MILES
DESIGN FREEBOARD —— 5.5 FEET
TOP OF DAM ELEV —— 1241 USGS
TOTAL ACQUISITION —— 691.27 ACRES
FLOWAGE EASEMENT —— 0.66 ACRES
CONTOURS AT 5 FOOT INTERVALS
ALL DIMENSIONS AND MEASUREMENTS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.
ALL ELECTRIC AND TELEPHONE LINES INSIDE NORMAL POOL ELEV 1235.0 TO BE RELOCATED
LOCATION MAP
SEAL

2



SEAL	SEAL

REVISED

APPROVALS
APPROVED
DIVISION, BUREAU OF PROJECTS & ENGINEERING
CHIEF, ENGINEERING SECTION
ADOPTED BY:
BY:

DRAWN BY	DATE	LINE CHECKED BY	DATE
	10-7-70	K.E.H.	10-7-70

PROJECT NO. F.C.-195L (93915-1)

TOPOGRAPHY & LOCATION MAP

MILL CREEK DAM SITE

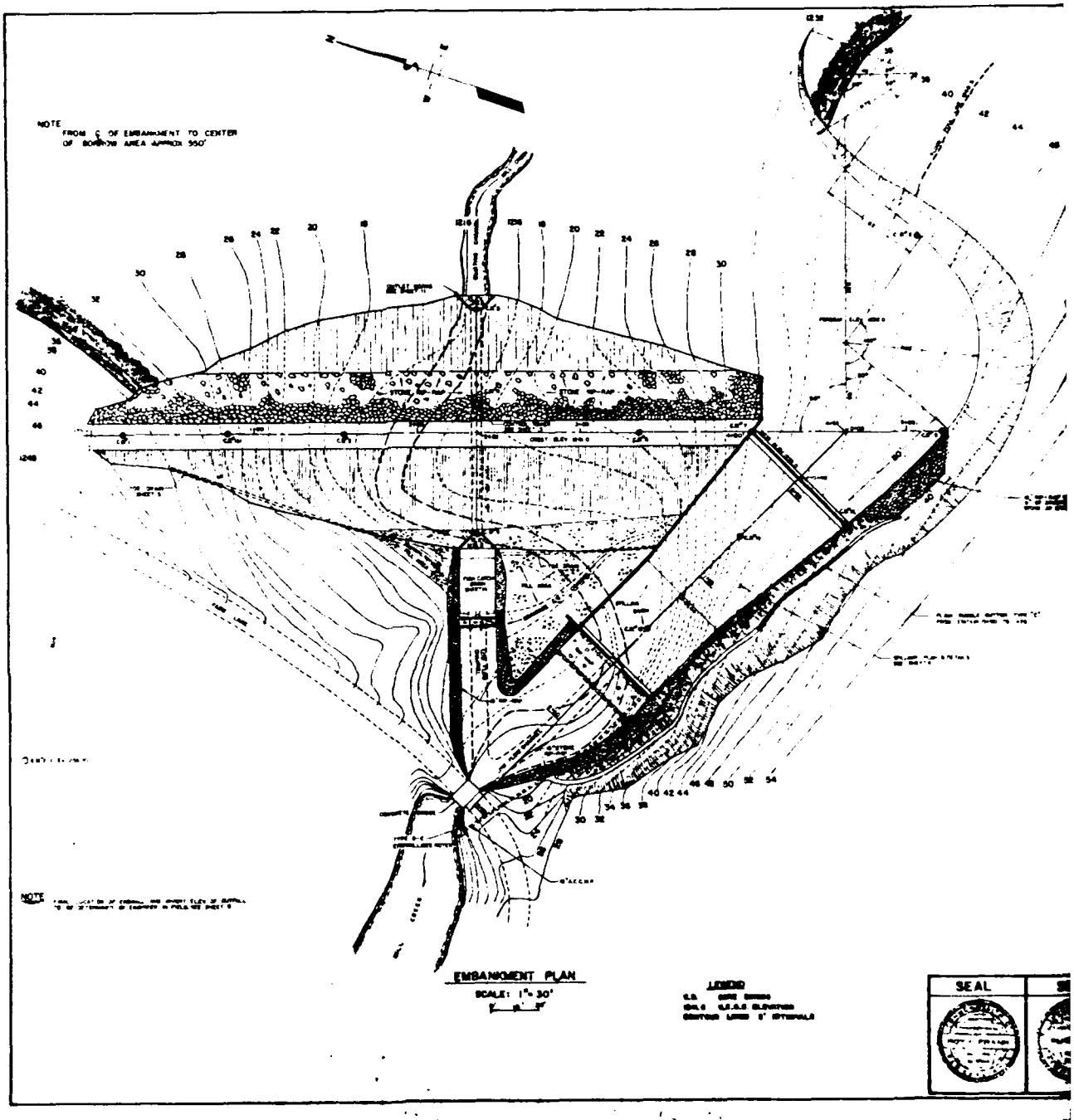
GAMBLE TOWNSHIP, LYCOMING COUNTY
PENNSYLVANIA

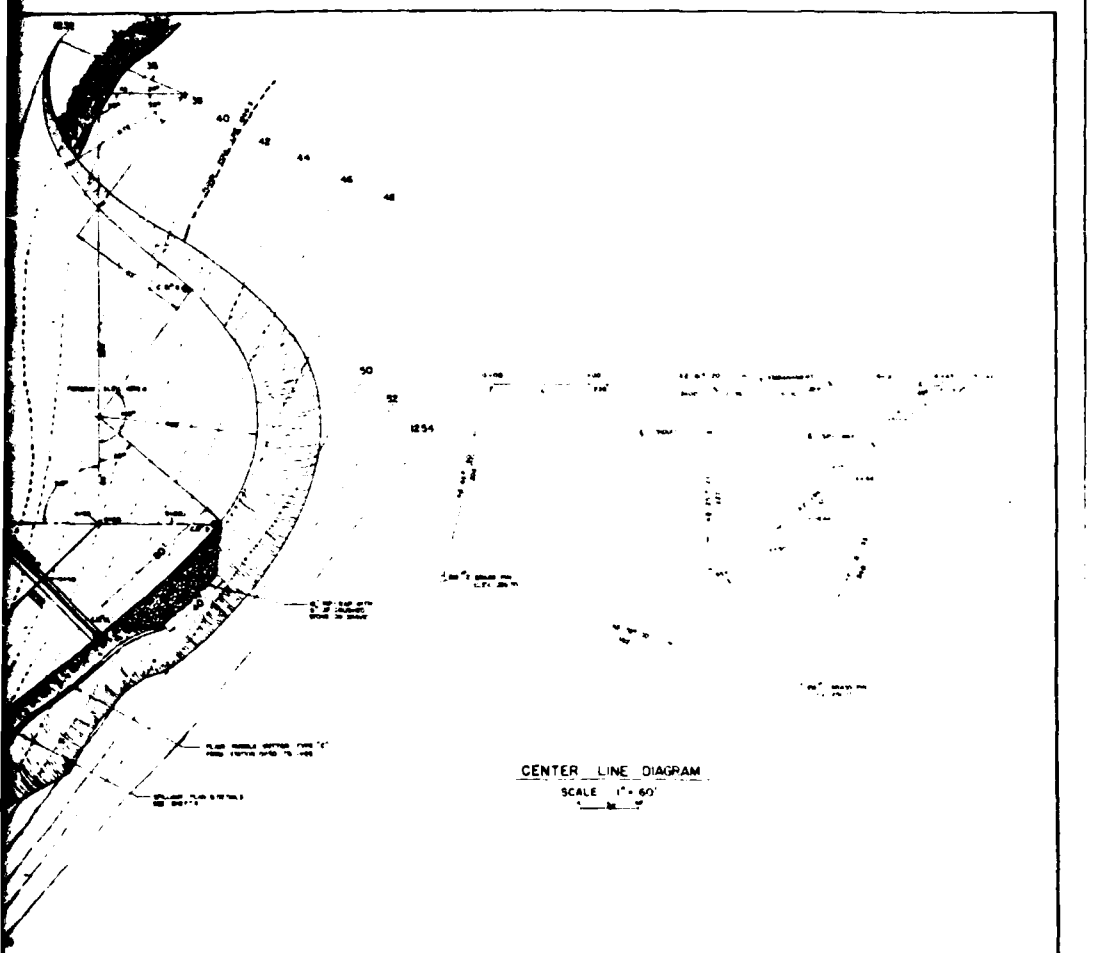
ROY R. FRAME — REGISTERED ENGINEER
R.R.#1, JERSEY SHORE, PENNA.

COMMONWEALTH OF PENNSYLVANIA	SCALE 1"=300'
DEPARTMENT OF ENVIRONMENTAL RESOURCES	DWG. FC-195L-SEC
ROBERT J. SHELLY, CHIEF ENGINEER	SHEET No. 2 OF 27

gai CONSULTANTS, INC.

FIGURE 2


NOTE
FROM ℄ OF EMBANKMENT TO CENTER
OF BORROW AREA APPROX 550'
EMBANKMENT PLAN
SCALE: 1"= 30'
LEGEND
SEAL



CENTER LINE DIAGRAM
SCALE 1" = 60'

NOTE
ALL DIMENSIONS AND MEASUREMENTS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE

SEAL	SEAL

REVISED

APPROVALS

DRAWN BY	DATE	CHECKED BY	DATE
GMB	10-15-70	K E H	10-17-70

PROJECT Nº F.C.-195L (93915-1)

EMBANKMENT PLAN

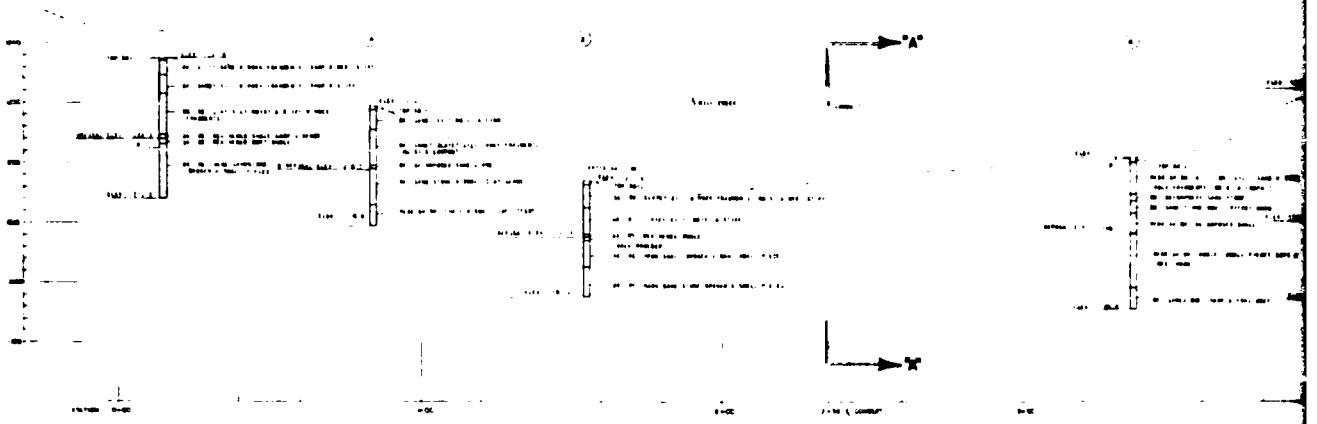
MILL CREEK DAM SITE
GAMBLE TOWNSHIP, LYCOMING COUNTY
PENNSYLVANIA
ROY R FRANK — REGISTERED ENGINEER
R.D.#1, JERSEY SHORE, PENNA.

COMMONWEALTH OF PENNSYLVANIA
MILTON J. SHAPP — GOVERNOR
PENNSYLVANIA FISH COMMISSION
ROBERT J. BIELO — EXEC. DIRECTOR
HARRISBURG — PENNSYLVANIA

SCALE NOTED
DWG No. FC-195L-32C
SHEET No. 3 of 27

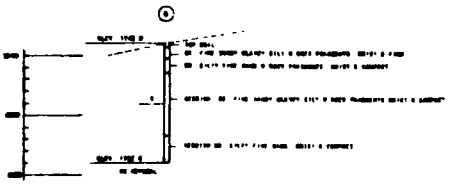
GAI CONSULTANTS, INC.

FIGURE 3

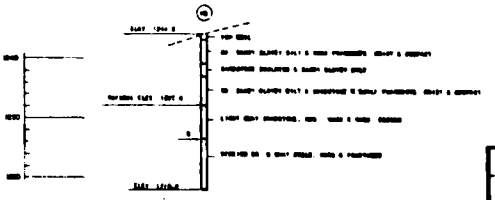


PROFILE "A"-"A" @ CONDUIT STA. 2+36
PERPENDICULAR TO EMBANKMENT ℄

PROFILE OF
36" CMP



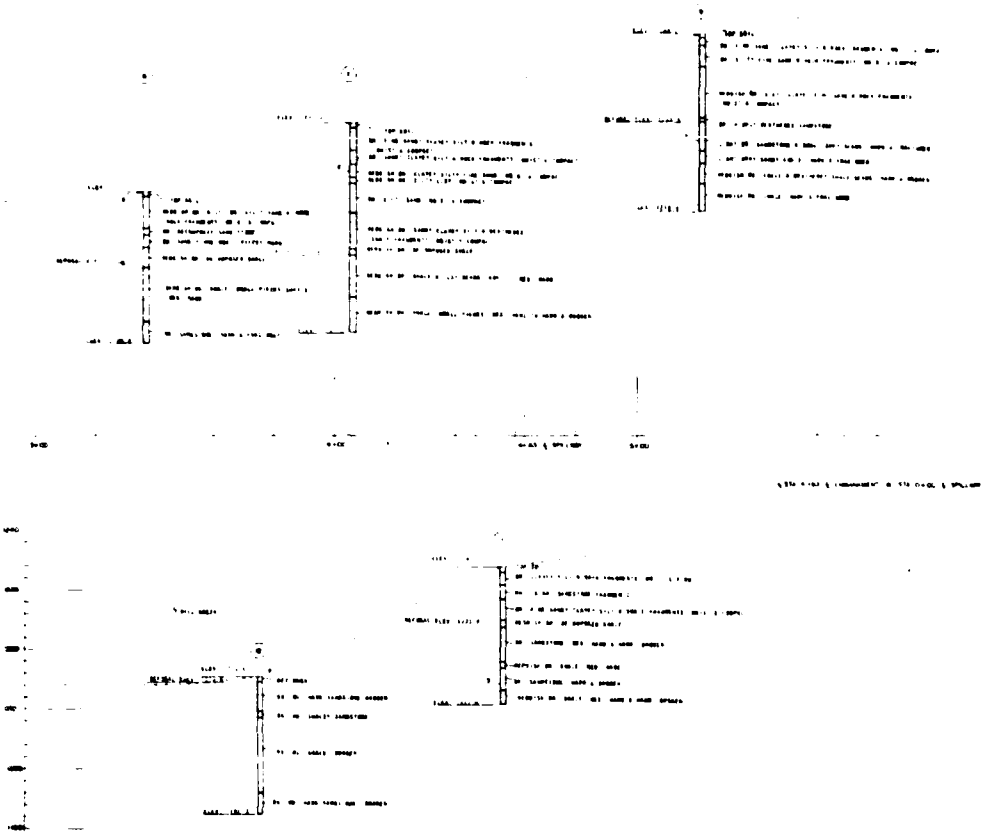
FOREBAY AREA
PARALLEL WITH EMBANKMENT ℄



END OF WEIR
PARALLEL WITH EMBANKMENT ℄

SEAL

2



PROFILE OF SPILLWAY ℄ LOCATION
90° OFF EMBANKMENT ℄

NOTE: ALL DATA SHOWN ABOVE HAS BEEN OBTAINED BY THE ENGINEER FOR THEIR OWN USE IN DESIGNING THIS PROJECT. IT'S ACCURACY OR COMPLETENESS IS NOT GUARANTEED. SEE SPECIAL REQUIREMENTS.

SEAL	SEAL

REVISED

APPROVALS			
DESIGNED BY gmm	DATE 12-7-70	CHECKED BY K.E.H.	DATE 12-8-70

PROJECT Nº. F.C.-1951 (93915-1)

PROFILE OF CORE BORINGS

MILL CREEK DAM SITE

SAMBLE TOWNSHIP, LYCOMING COUNTY
PENNSYLVANIA

ROY R. FRANK — REGISTERED ENGINEER
R.D. 1, JERSEY SHORE, PENNA.

COMMONWEALTH OF PENNSYLVANIA
MILTON J. SHAPP — GOVERNOR
PENNSYLVANIA FISH COMMISSION
ROBERT J. BIELO — EXEC. DIRECTOR
HARRISBURG — PENNSYLVANIA

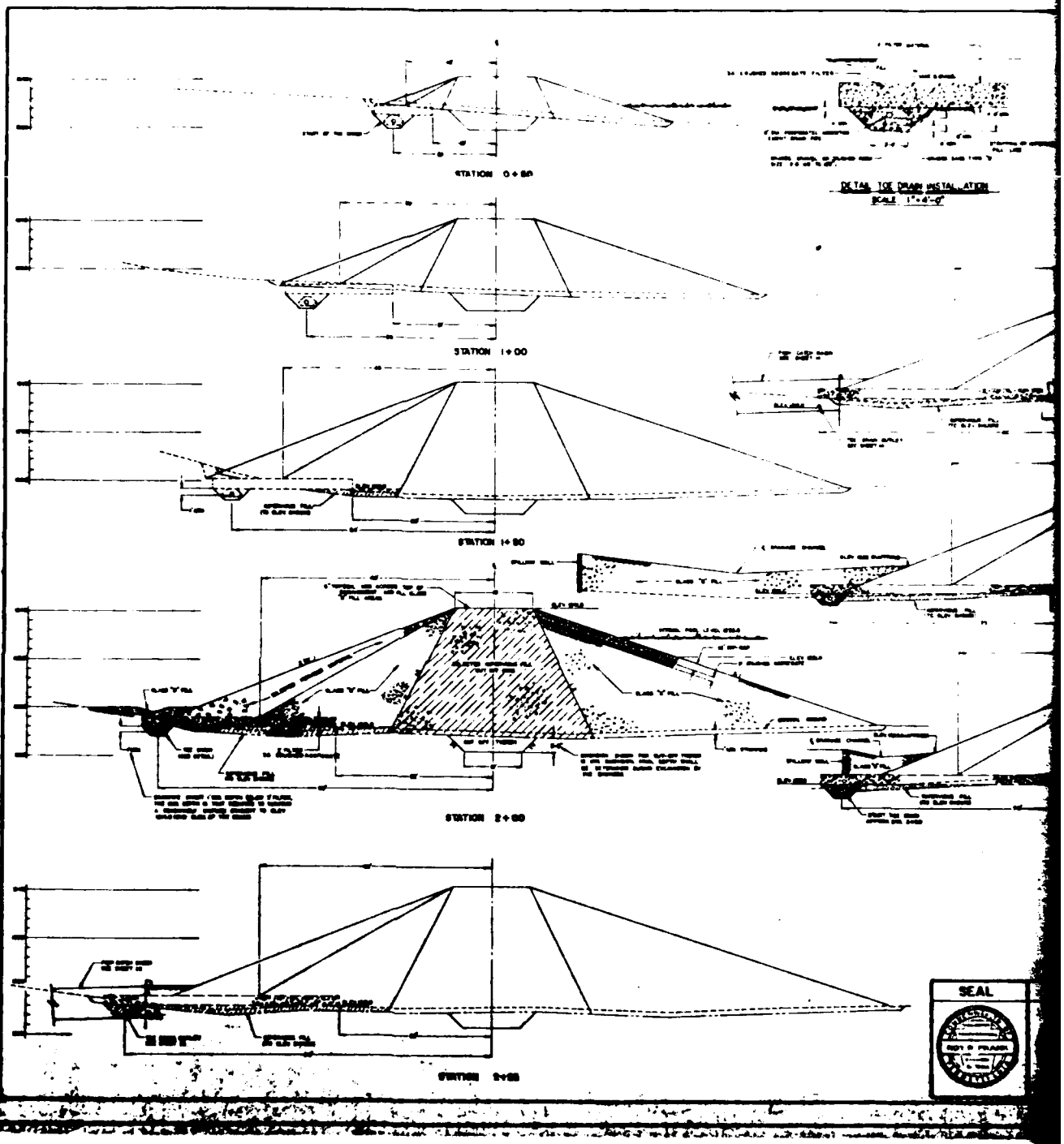
SCALE: 1" = 10'

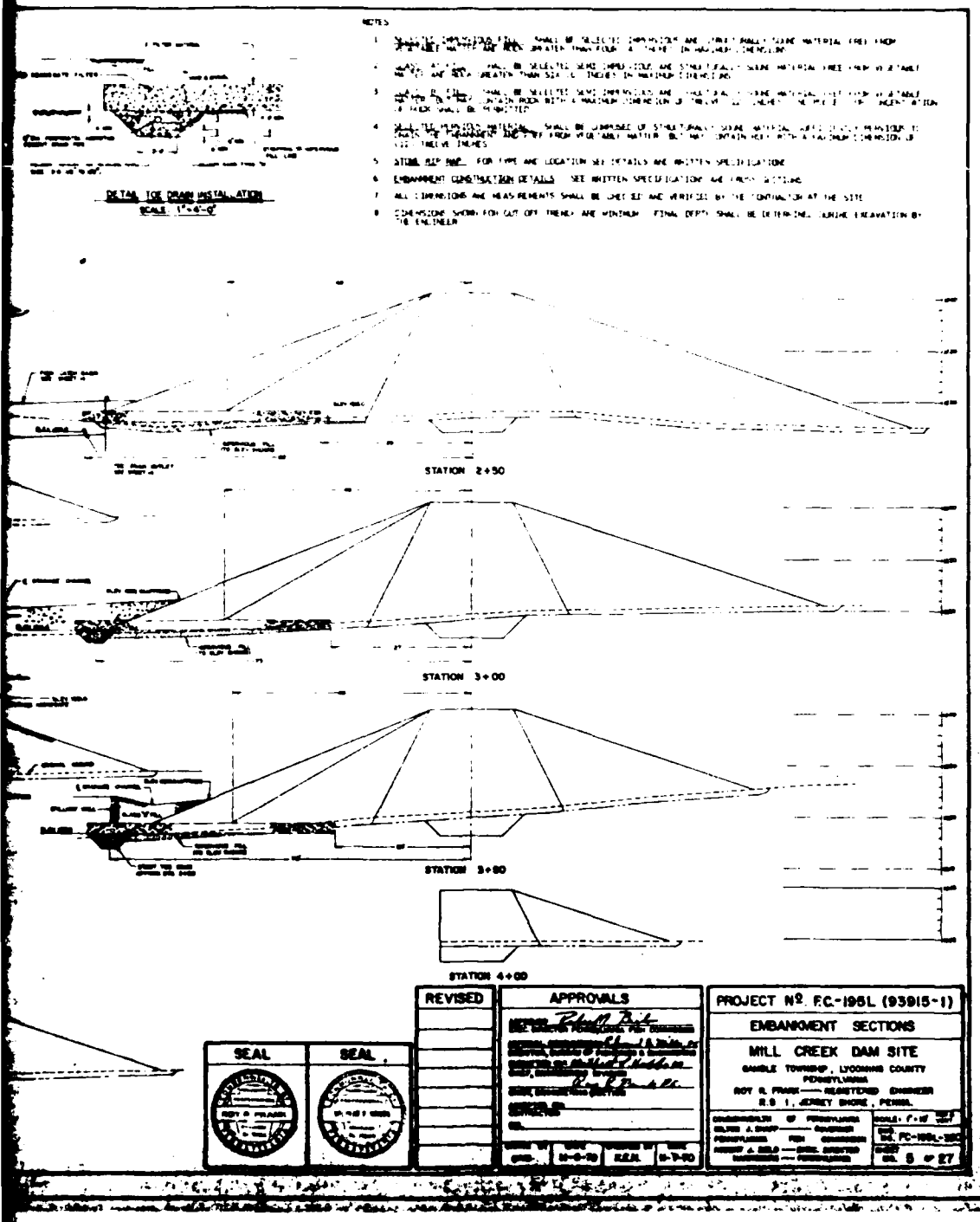
DWG. NO. FC-1951-12C

SHEET 4 OF 27

gai CONSULTANTS, INC.

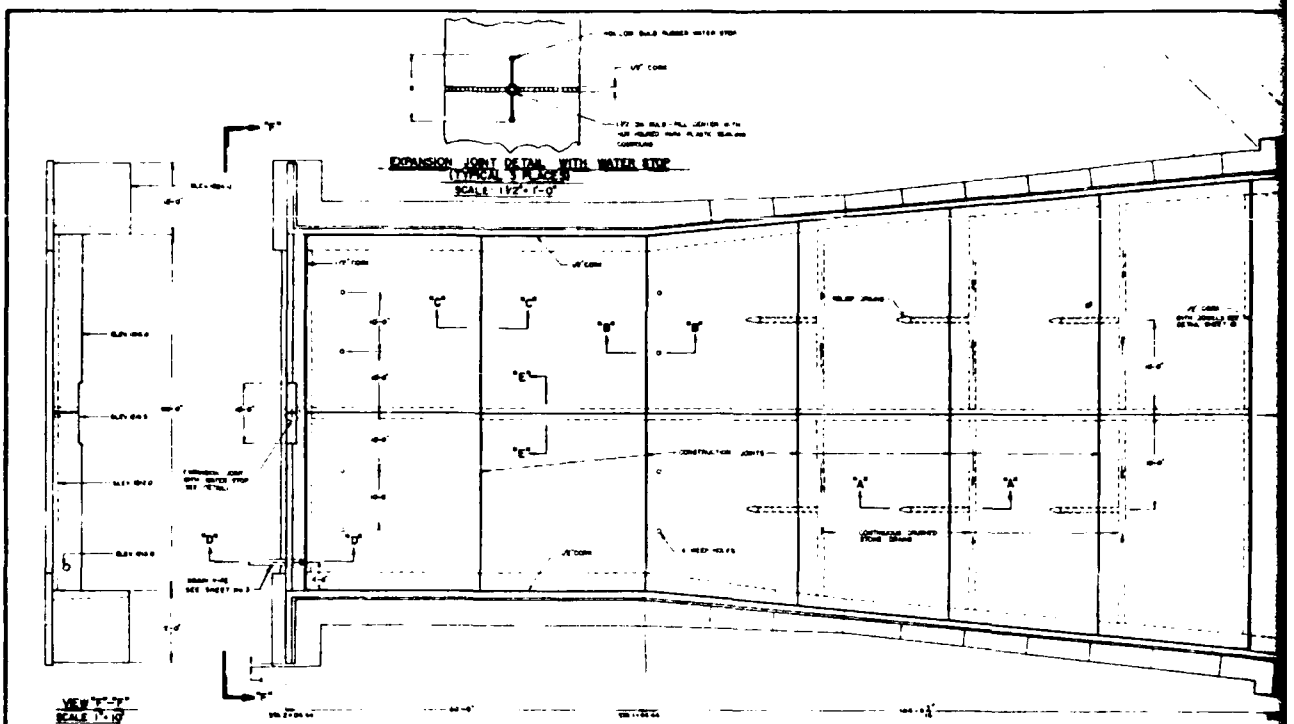
FIGURE 4


STATION 0+00
DETAIL TOE DRAIN INSTALLATION
STATION 1+00
STATION 1+50
STATION 2+00
SEAL



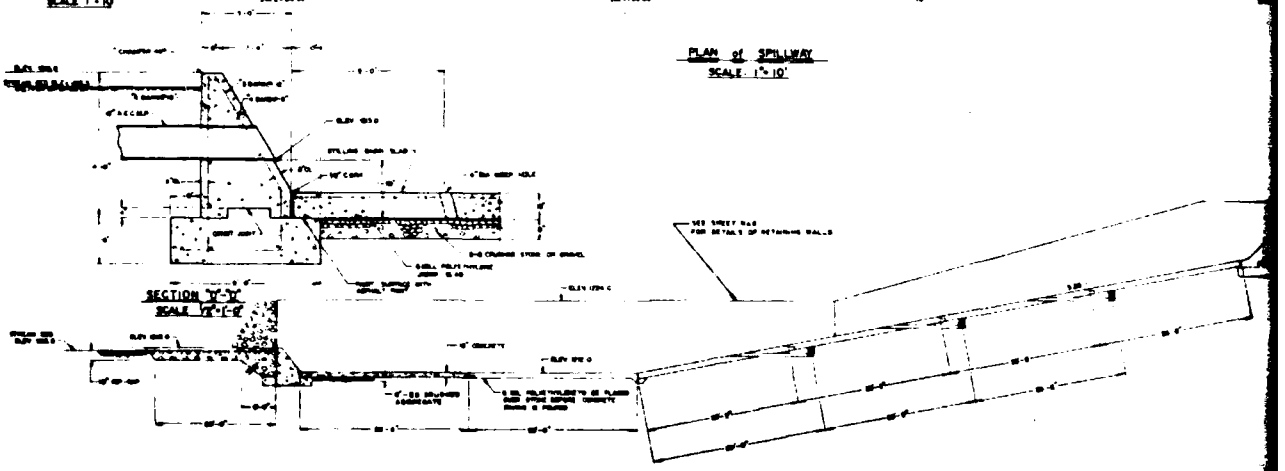
gai CONSULTANTS, INC.

FIGURE 5



EXPANSION JOINT DETAIL WITH WATER STOP
(TYPICAL 3 PLACES)
SCALE 1 1/2" = 1'-0"

VIEW "X"-"X"
SCALE 1" = 10'



PLAN of SPILLWAY
SCALE 1" = 10'

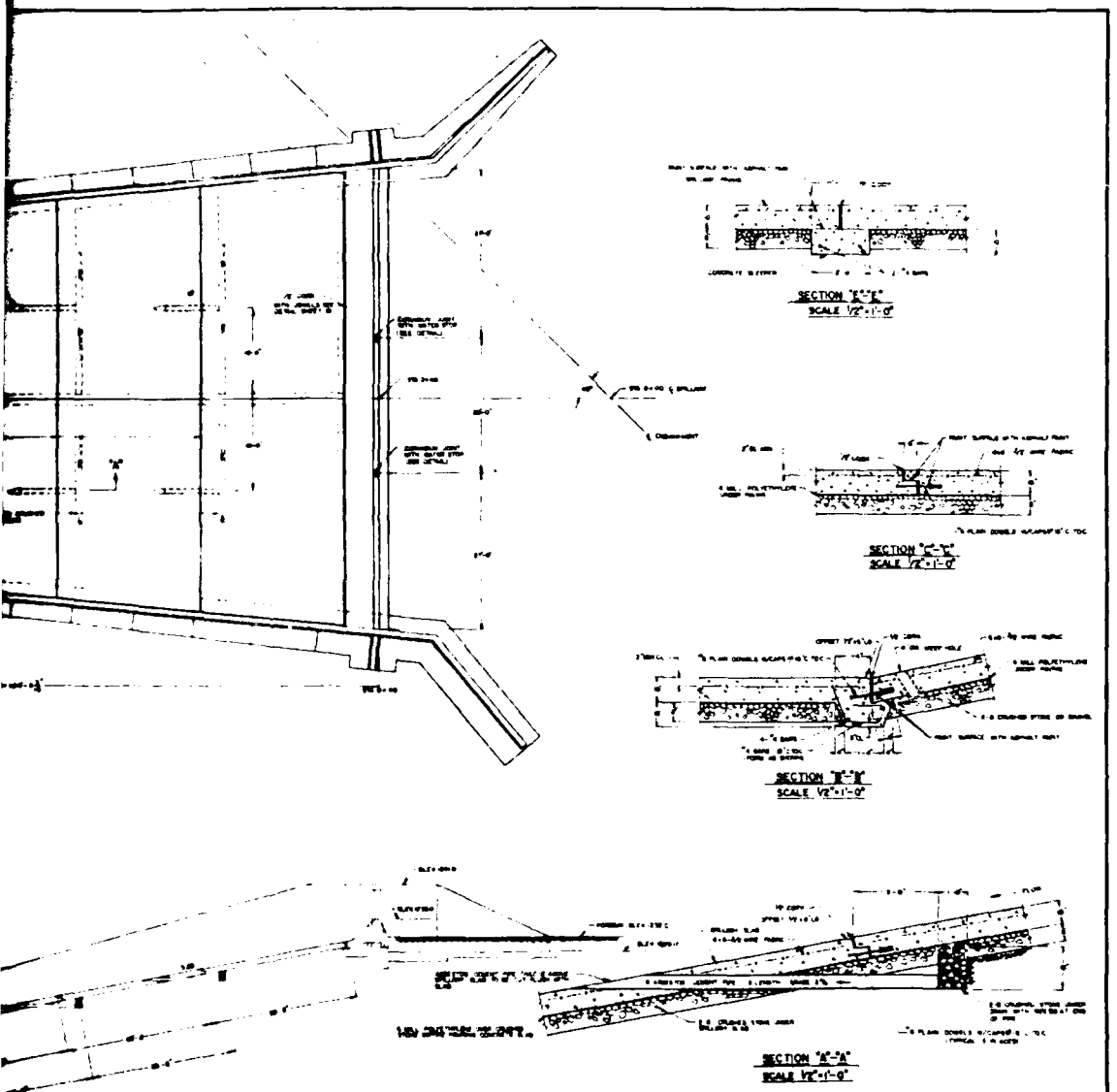
SECTION "Y"-"Y"
SCALE 1/4" = 1'-0"

PROFILE of SPILLWAY
SCALE 1" = 10'

NOTE

ALL DIMENSIONS AND MEASUREMENTS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

SEAL



SECTION "B"-"B"
SCALE 1/2"=1'-0"

SECTION "C"-"C"
SCALE 1/2"=1'-0"

SECTION "D"-"D"
SCALE 1/2"=1'-0"

SECTION "A"-"A"
SCALE 1/2"=1'-0"

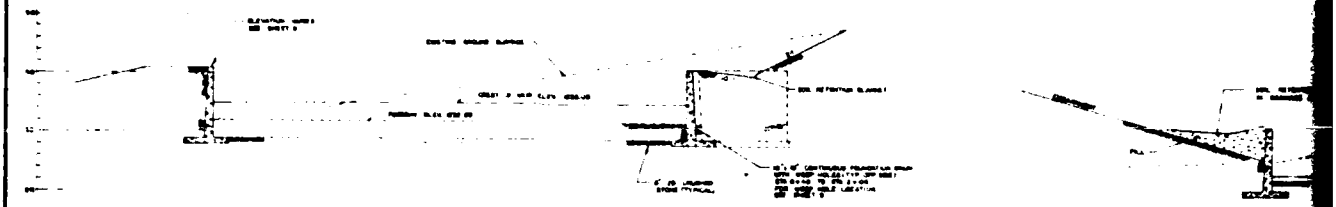
REVISED	APPROVALS	PROJECT NO. F.C.-195L (93915-1)
		SPILLWAY PLAN & DETAILS
		MILL CREEK DAM SITE
		ARMBLE TOWNSHIP, LYCOMING COUNTY, PENNSYLVANIA
		ROY A. FRANK — REGISTERED ENGINEER R.D.#1, JERSEY SHORE, PENNA.
	DESIGNED BY — DATE 11-8-70	CHECKED BY — DATE 11-7-70
		SCALE NOTED
		DWG. NO. FC-195L-SEC
		SHEET NO. 6 OF 27

SEAL SEAL

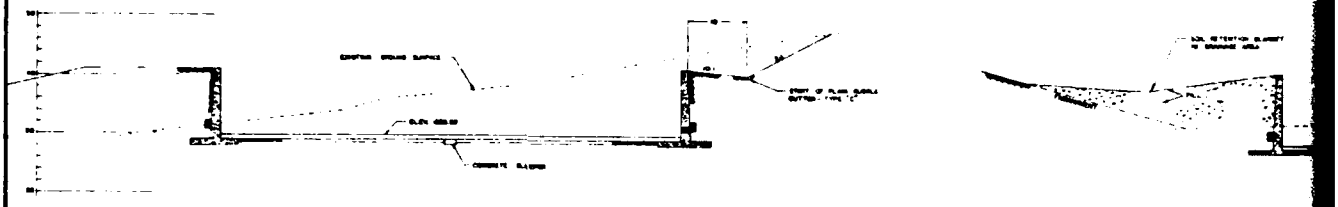
DIMENSIONS AND MEASUREMENTS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR ON THE SITE.

gai CONSULTANTS, INC.

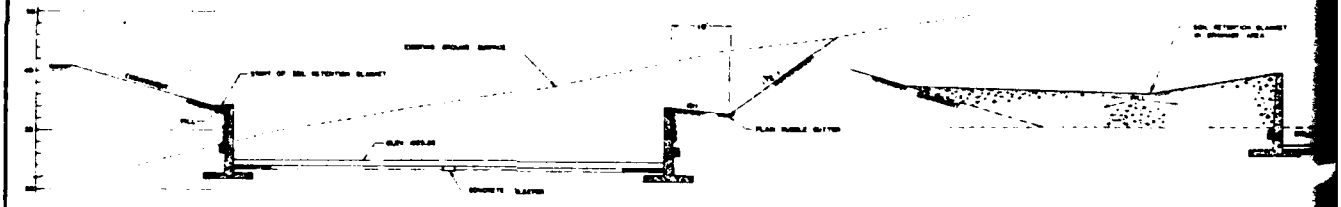
FIGURE 6



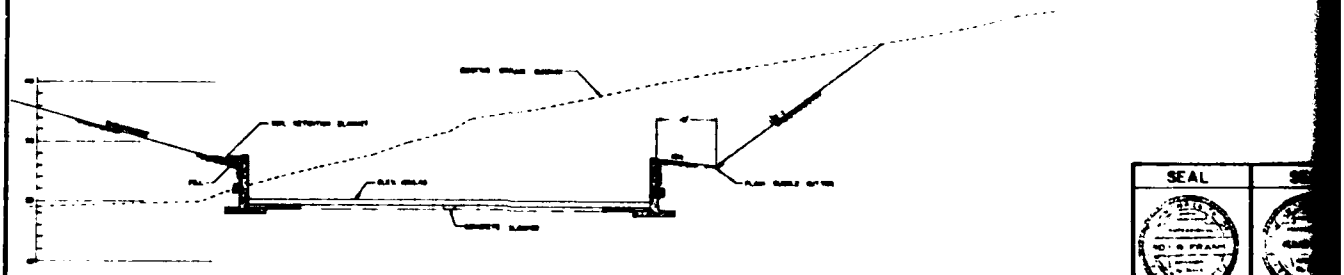
CROSS SECTION @ STATION 0+40



CROSS SECTION @ STATION 0+60

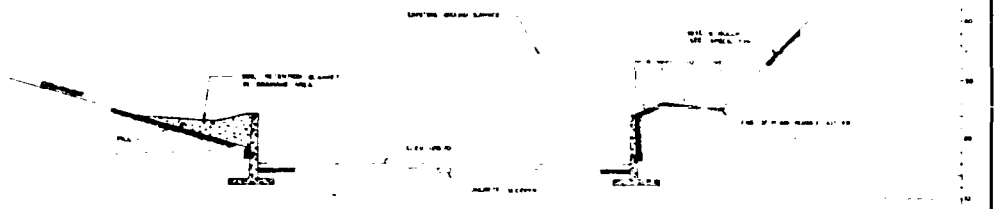


CROSS SECTION @ STATION 0+75

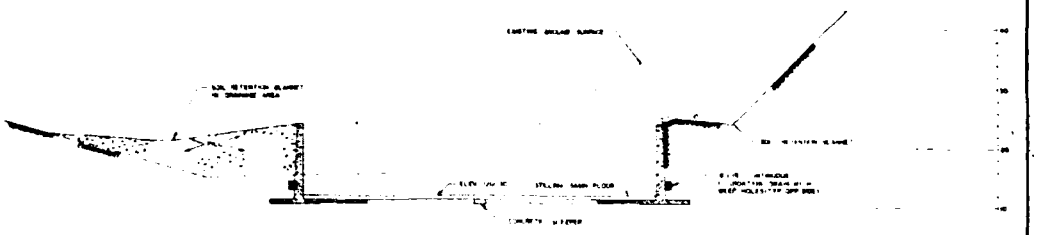


CROSS SECTION @ STATION 1+00

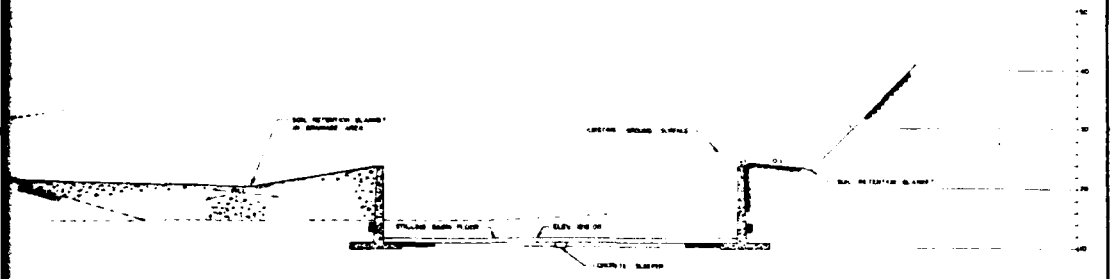
SEAL



CROSS SECTION @ STATION 1+25



CROSS SECTION @ STATION 1+50



CROSS SECTION @ STATION 1+75

NOTE
ALL DIMENSIONS AND MEASUREMENTS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE.

SEAL	SEAL
	

REVISED

APPROVALS			
APPROVED: Exec. Director, Pennsylvania Fish Commission			
APPROVED: Director, Bureau of Forestry & Waterways			
SUBMITTED BY: Chief, Engineering Division			
Chief, Engineering Section			
ACCEPTED BY: Contractor			
BY:			
DRAWN BY: gmm	DATE: 10-20-70	CHECKED BY: K.E.H.	DATE: 10-21-70

PROJECT NO. F.C.-195L (93915-1)

SPILLWAY SECTIONS

MILL CREEK DAM SITE

GAMBLE TOWNSHIP, LYCOMING COUNTY
PENNSYLVANIA

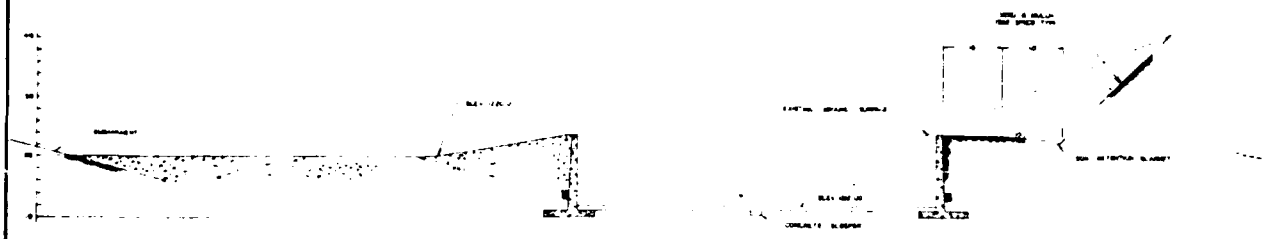
ROY R. FRANK — REGISTERED ENGINEER
R.D. #1, JERSEY SHORE, PENNA.

COMMONWEALTH OF PENNSYLVANIA
MILTON J. SHAPP — GOVERNOR
PENNSYLVANIA FISH COMMISSION
ROBERT A. BIELO — EXEC. DIRECTOR
HARRISBURG — PENNSYLVANIA

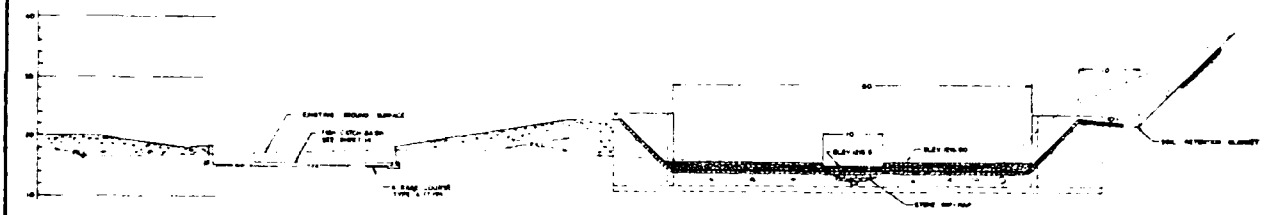
SCALE 1" = 10'
DWG NO. FC-195L-SEC
SHEET NO. 7 of 27

GAI CONSULTANTS, INC.

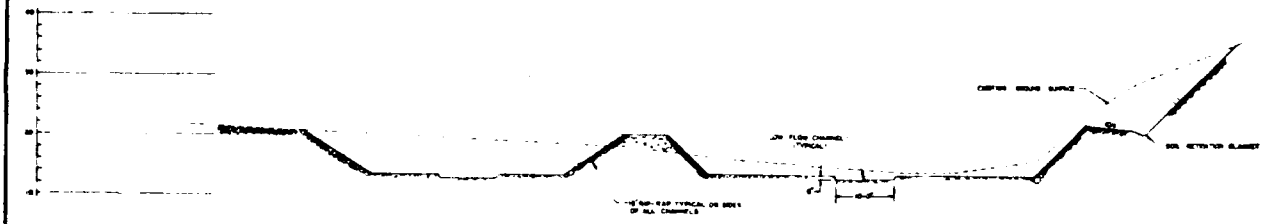
FIGURE 7



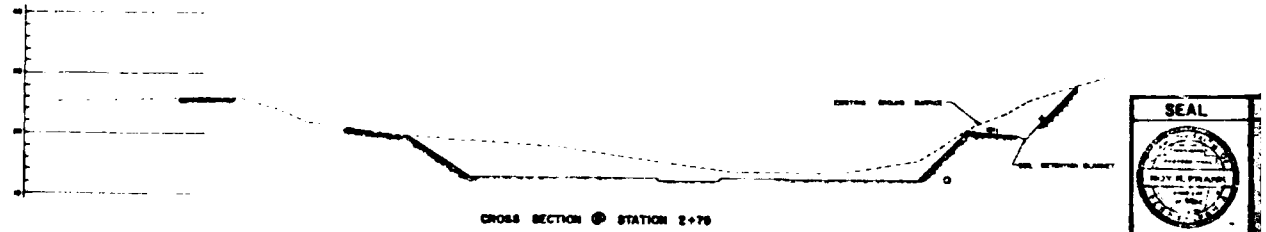
CROSS SECTION @ STATION 2+00



CROSS SECTION @ STATION 2+25

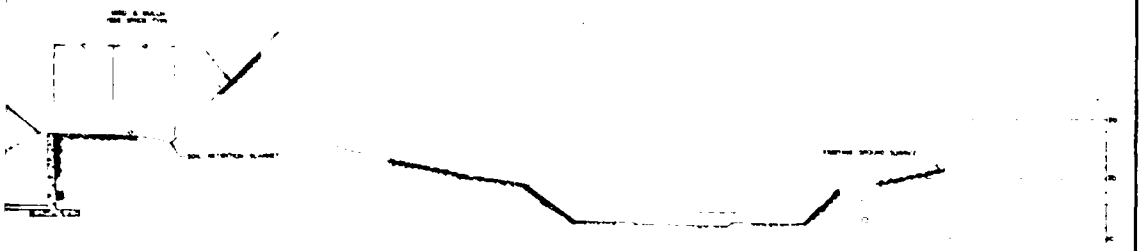


CROSS SECTION @ STATION 2+50

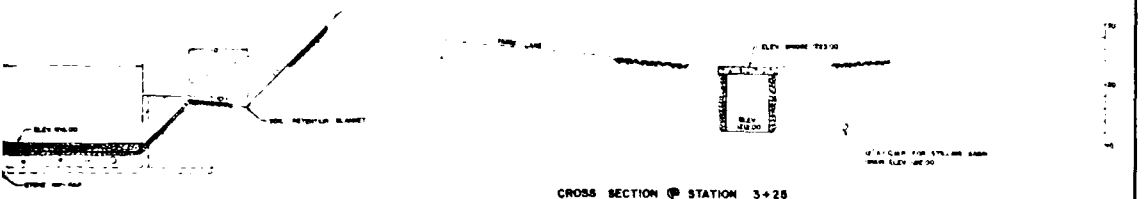


CROSS SECTION @ STATION 2+75

SEAL

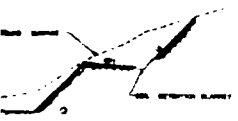


CROSS SECTION @ STATION 3+00



CROSS SECTION @ STATION 3+28

NOTE:
ALL DIMENSIONS AND MEASUREMENTS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE



SEAL	SEAL
ROY R. FRANK	

REVISED

APPROVALS			
APPROVED: Robert P. Bell, EXEC. DIRECTOR PENNSYLVANIA FISH COMMISSION			
RECOMMENDED: [illegible], DIRECTOR, BUREAU OF [illegible]			
SUBMITTED BY: [illegible] CHIEF, ENGINEERING DIVISION			
CHIEF, ENGINEERING SECTION: Roy R. Frank P.E.			
ACCEPTED BY: CONTRACTOR:			
BY:			
Sketch BY: gmm	DATE: 10-22-70	CHECKED BY: K.E.M.	DATE: 10-23-70

PROJECT Nº. FC-195L (93915-1)

SPILLWAY & OUTLET CHANNEL SECT.

MILL CREEK DAM SITE

GAMBLE TOWNSHIP, LYCOMING COUNTY
PENNSYLVANIA

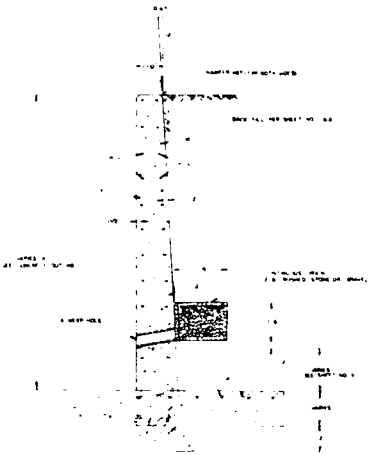
ROY R. FRANK — REGISTERED ENGINEER
R.D. #1, JERSEY SHORE, PENNA.

COMMONWEALTH OF PENNSYLVANIA
MILTON J. SHAPP — GOVERNOR
PENNSYLVANIA FISH COMMISSION
ROBERT J. SHELLO — EXEC. DIRECTOR
HARRISBURG — PENNSYLVANIA

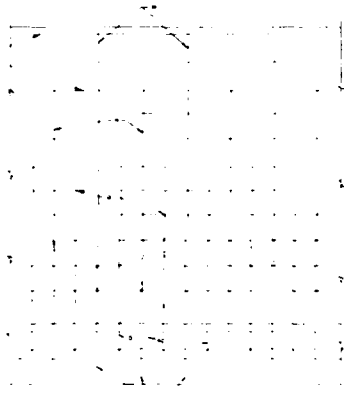
SCALE: 1" = 10' (HORIZ.) 1" = 5' (VERT.)
Dwg. No. FC-195L-52C
SHEET NO. 8 OF 27

gai CONSULTANTS, INC.

FIGURE 8

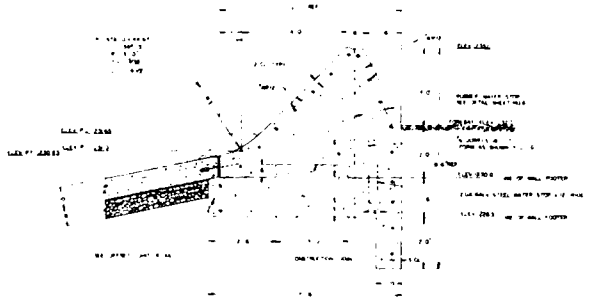


TYPICAL SECTION
SCALE 1/2" = 1'-0"
RIGHT SIDE SHOWN
LEFT SIDE OPPOSITE



ELEVATION
SCALE 1/2" = 1'-0"

VERTICAL STEEL IN BACK OF WALL MAY BE
M = N ALTERNATE
M = O = N = O
O = T ALTERNATE



SECTION THRU WEIR
SCALE 1/2" = 1'-0"

OFFSET JOINT DETAIL
SPILLWAY CHANNEL
SCALE 3/4" = 1'-0"

REINFORCE

	M		N	
7				
10				
11				
12				
13				
14				

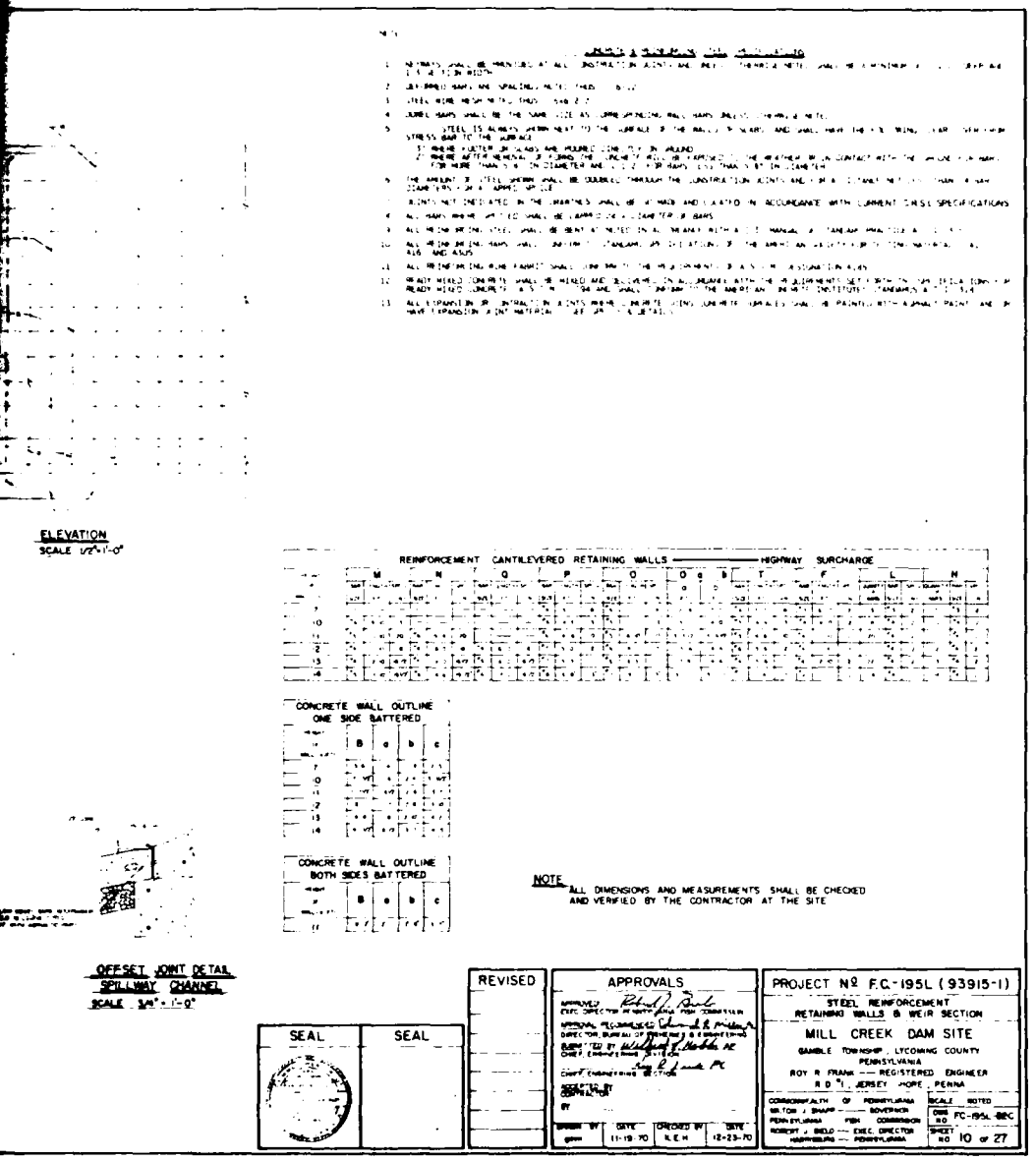
CONCRETE WALL OUTLINE
ONE SIDE BATTERED

	B	a	b	c
7				
10				
11				
12				
13				
14				

CONCRETE WALL OUTLINE
BOTH SIDES BATTERED

	B	a	b	c
10				

SEAL	SEAL



ELEVATION
SCALE 1/2"=1'-0"

REINFORCEMENT CANTILEVERED RETAINING WALLS ——— HIGHWAY SURCHARGE

CONCRETE WALL OUTLINE
ONE SIDE BATTERED

CONCRETE WALL OUTLINE
BOTH SIDES BATTERED

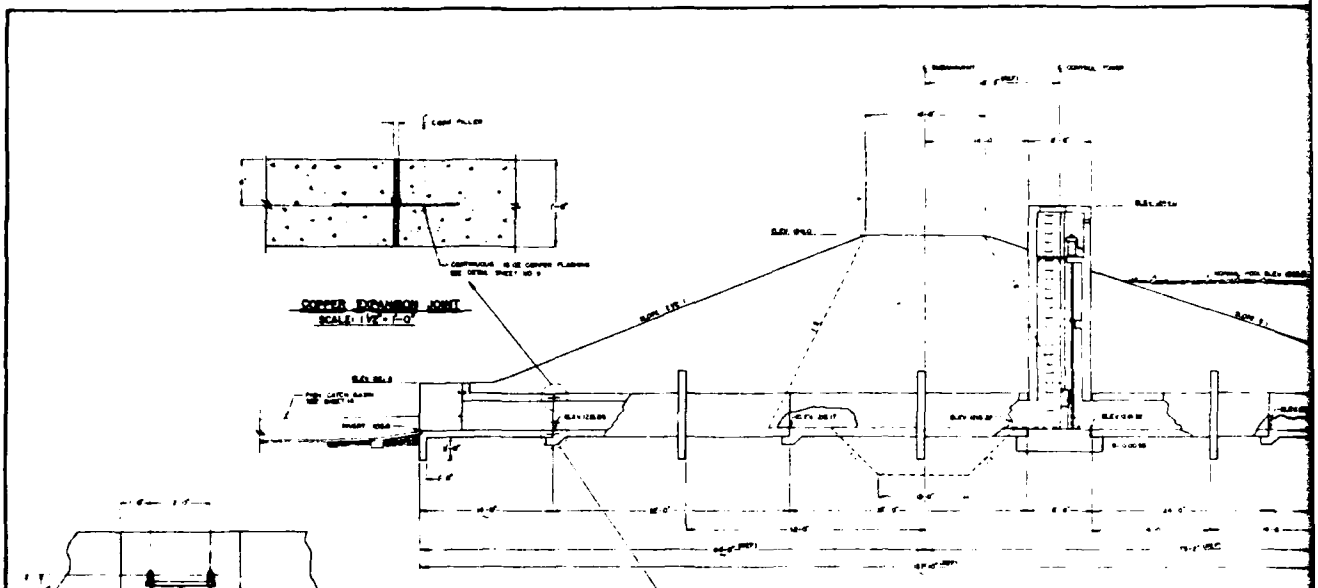
NOTE
ALL DIMENSIONS AND MEASUREMENTS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE

OFFSET JOINT DETAIL
SPILLWAY CHANNEL
SCALE 3/4"=1'-0"

SEAL	SEAL	REVISED	APPROVALS	PROJECT Nº F.C.-195L (93915-1)
			APPROVED Richard J. Bish EXEC. DIRECTOR SUSQUEHANNA RIVER BASIN COMMISSION NATIONAL RESOURCES Charles E. Murphy DIRECTOR, BUREAU OF DAMS & WATERWAYS SUBMITTED BY William E. Hobbs PE CHIEF, ENGINEERING SECTION Ray R. Frank PE CHIEF ENGINEERING SECTION ACCEPTED BY COMMISSION BY DESIGN BY: gpm — DATE: 11-19-70 — CHECKED BY: R.E.H — DATE: 12-23-70	STEEL REINFORCEMENT RETAINING WALLS & WEIR SECTION MILL CREEK DAM SITE GAMBLE TOWNSHIP, LYCOMING COUNTY PENNSYLVANIA ROY R FRANK — REGISTERED ENGINEER R.D. #1, JERSEY SHORE, PENNA COMMONWEALTH OF PENNSYLVANIA — SCALE: NOTED MILTON J. SHAPP — GOVERNOR — DWG NO: FC-195L-88C PENNSYLVANIA FISH COMMISSION ROBERT J. BIELO — EXEC. DIRECTOR — SHEET NO: 10 OF 27 HARRISBURG — PENNSYLVANIA

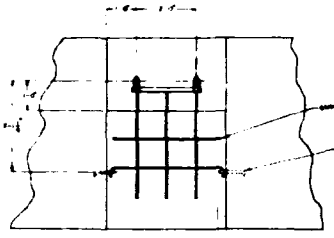
GAI CONSULTANTS, INC.

FIGURE 9

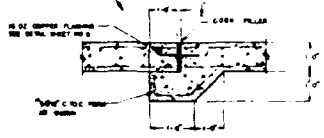


COPPER EXPANSION JOINT
SCALE: 1 1/2" = 1'-0"

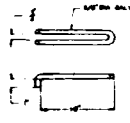
OUTLET WORKS - ELEVATION
SCALE 1/8" = 1'-0"

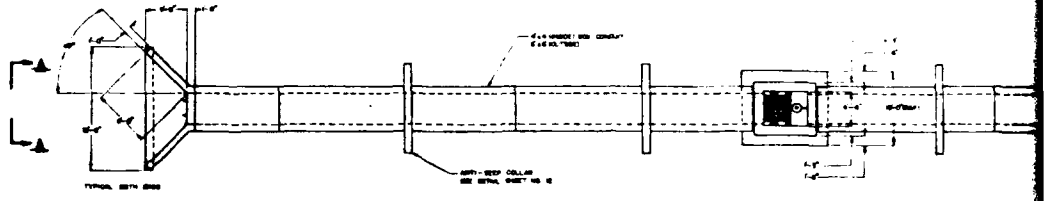


VIEW "A"-"A"
SCALE 1/2" = 1'-0"



CONCRETE SLEEPER DETAIL
SCALE: 1/2" = 1'-0"

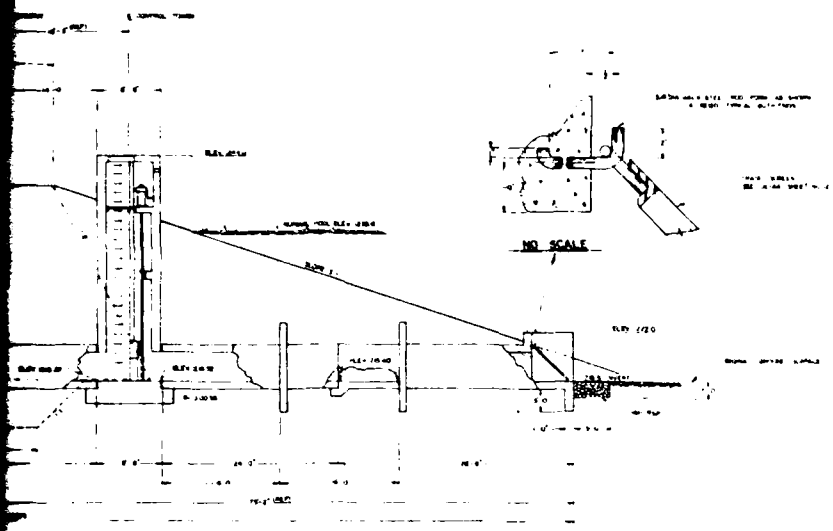




OUTLET WORKS - PLAN
SCALE 1/8" = 1'-0"

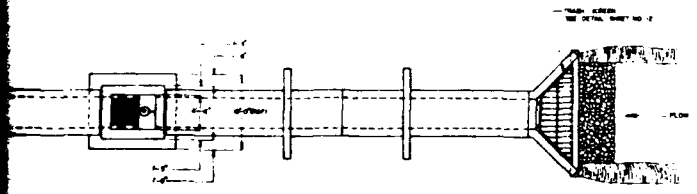
NOTE:
ALL DIMENSIONS AND MEASUREMENTS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR AT THE SITE

SEAL	



OUTLET WORKS - ELEVATION
SCALE 1/8"=1'-0"

NOTE



ET WORKS - PLAN
SCALE 1/8"=1'-0"

BE CHECKED
E SITE

SEAL	SEAL

REVISED

APPROVALS			
APPROVED: Executive Director Pennsylvania Fish Commission			
APPROVAL RECOMMENDED: Director, Bureau of Fisheries & Engineering			
SUBMITTED BY: Chief, Engineering Division			
CHIEF, Engineering Section			
ACCEPTED BY: Contractor			
By:			
DRAWN BY: gmm	DATE: 12-8-70	CHECKED BY: K.E.H.	DATE: 12-23-70

PROJECT Nº. F.C.-195L (93915-1)	
OUTLET WORKS	
MILL CREEK DAM SITE DAMBLE TOWNSHIP, LYCOMING COUNTY PENNSYLVANIA ROY R. FRANK — REGISTERED ENGINEER R.D. 1, JERSEY SHORE, PENNA	
COMMONWEALTH OF PENNSYLVANIA MILTON J. SHAPP — GOVERNOR PENNSYLVANIA FISH COMMISSION ROBERT J. BIELO — EXEC. DIRECTOR HARRISBURG — PENNSYLVANIA	SCALE: 1/8"=1'-0" & NOTED DWG. No. FC-195L-52C SHEET No. 11 of 27

CONSULTANTS, INC.

FIGURE 10

APPENDIX F

GEOLOGY

Geology

Rose Valley Lake Dam is located within the glaciated portion of the Allegheny High Plateaus section of the Appalachian Plateaus physiographic province of north central Lycoming County, Pennsylvania. The principal bedrock unit present at the dam site is the Catskill member of the Susquehanna Group of Devonian age. Soils, generally on the north, northeast and south shores are derived from glacial till whereas the soils underlying the site of the present reservoir consist of glacial lake sediments. The glacial deposits in the area were developed during Wisconsin time--the most recent period of continental glaciation.

The Catskill member is poorly represented in outcrop throughout the area; however, outcrops in the Mill Creek gorge just west of the dam suggests the Catskill strata in the dam site area is a sequence of red, moderately well-indurated, very fine to fine grained sandstones alternating with moderately well-indurated red shales. The dominance of silt and clay in the soil indicates that shale is the dominant lithology. Weathering of this rock produces a mass of sand, silt and clay with numerous slabs of angular sandstone. This weathered material mantles the unglaciated part of this area and is well developed in the middle reaches of Mill Creek gorge just downstream of the dam.

The glacial till in the area is terminal moraine deposited by a Wisconsin ice advance which came from the northeast.

The glacial till is a red, unsorted, unconsolidated mixture of sand, silt, clay, pebbles, and cobbles with some small boulders. The cobbles are angular plates of red siltstone or sandstone and subangular to well-rounded gray sandstones. The cobbles range in size from three inches to one foot in diameter and the boulders rarely exceed two feet in diameter. The material is almost entirely locally derived from rocks of the Catskill Group and greatly resembles the weathered Catskill material. The clayey nature of the till makes the unit a relatively impermeable mass.

The thickness of the till is not known, but it appears to vary considerably. Some exposures near the tops of hills east of the reservoir show less than 1-foot of till on the Catskill Group rocks while the morphology of some of the area suggests that the till may be 50 feet or more thick along the southeastern margin of the reservoir.

The reservoir area is floored by a light-gray, somewhat iron-stained, relaitvely impermeable, silty clay lake deposit which is at least four feet thick. The clay is probably

thickest in the eastern part of the reservoir area and the margins of the deposit probably contain intermixed sand and gravel.

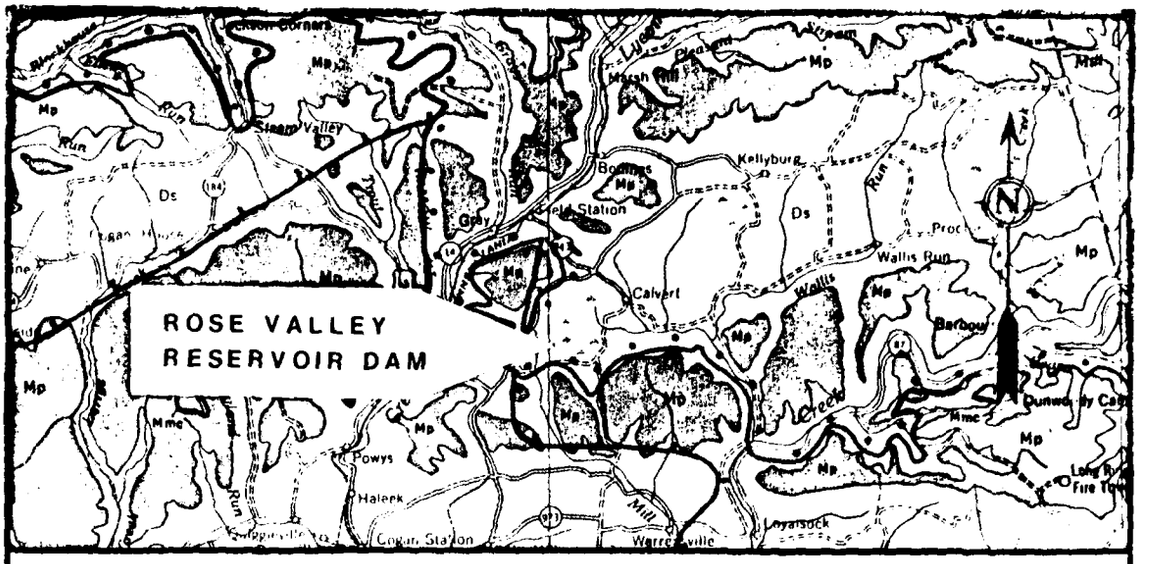
Structurally, the site lies nearly on the axial trace of the Rose Valley anticline. The Rose Valley anticline is a doubly plunging structure of low relief trending in an east-northeast and west-southwest direction. At the dam site, the bedrock surface dips gently to the southwest.

---

[1]Denny, Charles S and Lyford, Walter H., "Surficial Geology and Soils of the Elmira-Williamsport Region, New York and Pennsylvania," Geological Survey Professional Paper 379, United States Government Printing Office, Washington, D. C., 1963.

[2]Lohman, Stanley W., "Ground Water in Northcentral Pennsylvania," Pennsylvania Geological Survey Fourth Series, Bulletin 26, Harrisburg, Pennsylvania, 1939.

[3]Sevon, William D., "Geology of the Proposed Mill Creek Dam Site, Gamble Township, Lycomina County, Pennsylvania," Pennsylvania Geologic Survey, Harrisburg, Pennsylvania, 1966.



LEGEND

PENNSYLVANIAN

Pp — Pottsville Group

Light gray to white, coarse grained sandstones and conglomerates with some minerable coal, includes Sharp Mountain, Schuylkill, and Tumbling Run Formations.

MISSISSIPPIAN

Mmc — Mauch Chunk Formation

Red shales with brown to greenish gray flaggy sandstones, includes Greenbrier Limestone in Fayette, Westmoreland, and Somerset counties, Loyalhanna Limestone at the base in southwestern Pennsylvania.

Mp — Pocono Group

Predominantly gray, hard, massive, cross-bedded conglomerate and sandstone with some shale, includes in the Appalachian Plateau Burgoon, Shenango, Cuyahoga Cussewago, Corry and Knapp Formations, includes part of Oswayo of M. L. Fuller in Potter and Tioga counties.

DEVONIAN

Ds — Susquehanna Group

barbed line is "Chemung-Catskill" contact of Second Pennsylvania Survey County reports; barbs on "Chemung" side of line.

Border of Illinoian drift

Border of Wisconsin drift

Note: The bedrock surface is covered with Pleistocene age Wisconsin and Illinoian till composed of sands, gravels and silty clays of variable thicknesses.

Scale

0 2 4 6 8 10 MILES

REFERENCE

GEOLOGIC MAP OF PENNSYLVANIA PREPARED BY COMMONWEALTH OF PENNA. DEPT. OF INTERNAL AFFAIRS, DATED 1960, SCALE 1" = 4 MILES

GEOLOGY MAP

GAI CONSULTANTS, INC.